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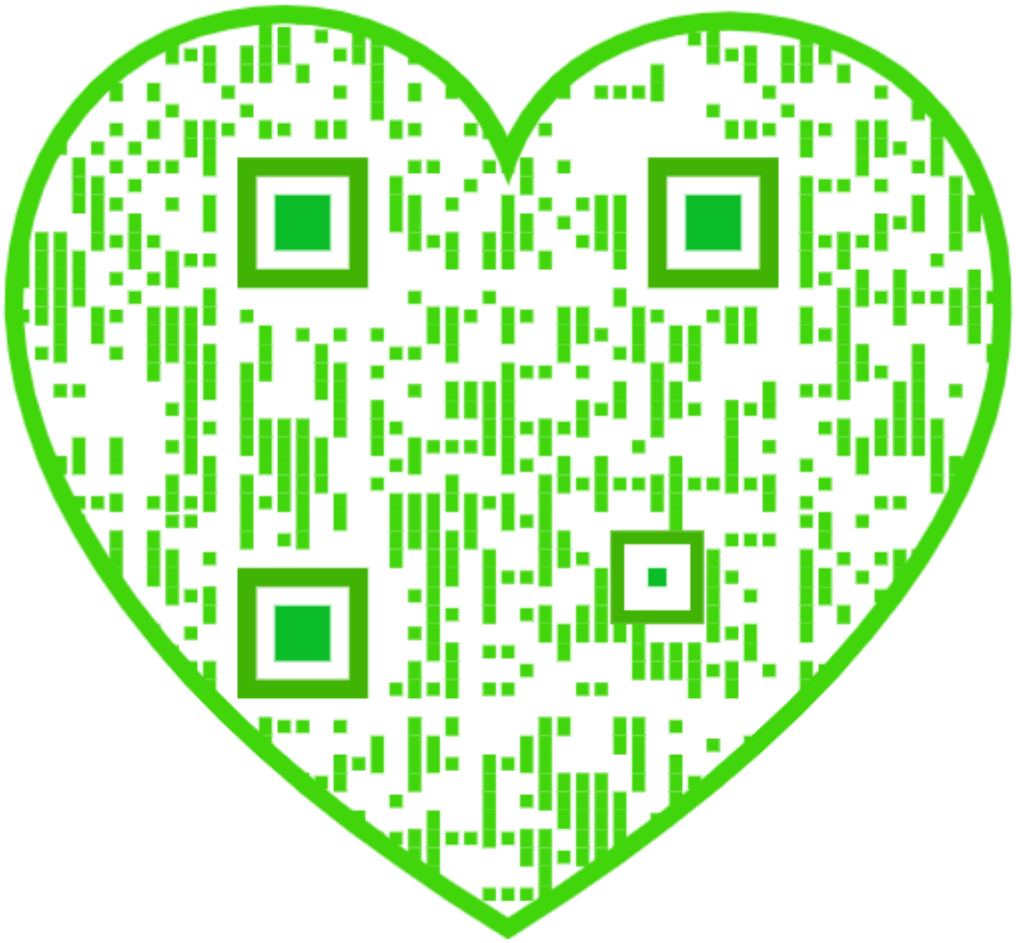

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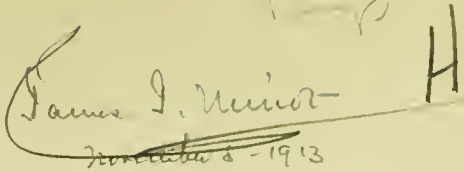
James T. Minot
1913

EARLY PULMONARY TUBERCULOSIS

DIAGNOSIS, PROGNOSIS AND TREATMENT

BY

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NEW YORK

WILLIAM WOOD AND COMPANY

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THE QUINN & BODEN CO. PRESS
RAHWAY, N. J.

PREFACE

There are plenty of large authoritative books about tuberculosis. There are plenty of small books which are not authoritative. Dr. Hawes has written a book which is small and yet authoritative. Therein lies its unique merit. Many of the points on which he expresses himself so frankly and tersely are hotly controverted points and he has not formed his opinion without giving due consideration to what is to be said upon all sides. In the end I think he has arrived at a set of beliefs expressing the best knowledge of the time. His wide and varied experience in the clinical management of tuberculous patients at the Massachusetts General Hospital is balanced by a ripe acquaintance with the social and institutional side of the tuberculosis problem. His position as secretary to the commission in charge of the four tuberculosis sanatoria maintained by the State of Massachusetts brings him into close touch with all of the problems relating to the sanatorium care of tuberculous patients. At the same time, he sees these institutions from without and from the standpoint of an active general practitioner. I feel sure that the book will be of use to many physicians.

Richard C. Cabot, M.D.

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INTRODUCTION

It is a bold step for any young and untried author to offer to the medical profession a new book on tuberculosis. Fully realizing the boldness of this undertaking, I am firm in the belief that there is a very definite place for a short, cheap book, which presents the essential points in the diagnosis, treatment and prognosis of early pulmonary tuberculosis.

This book is intended for the general practitioner who rarely has the time to delve into large and expensive volumes in order to pick out the particular bit of information of which he is in need. On the other hand it is the general practitioner who sees the patients in the early stages of the disease to whom we must look for those incipient cases whom we hope to cure in our sanatoria and elsewhere. It is all the more important, therefore, that information as to the means of making an early diagnosis of tuberculosis be placed before this large and most important part of our profession and that it be in such form as to be easy of access, clear, concise, brief and, so far as may be, correct.

For there is urgent need of a radical change for the better as regards the diagnosis of early pulmonary tuberculosis in this country. While a few of our private sanatoria which are supposed to receive incipient cases only may have a fairly high proportion of patients in the early stages, I doubt if at one of our state institutions we ever succeed in getting over fifty per cent (and rarely over forty per cent) of incipient cases. The number of physicians who still demand the presence of tubercle bacilli in the sputum before making a positive diagnosis is astonishingly large; the number of patients whose first

symptom was a hemorrhage, which according to their physician came from the nose, throat or stomach, and who later prove to have consumption, is equally great.

I do not underestimate the difficulties of making an early diagnosis nor the amount of criticism which many general practitioners will meet who are bold enough to make such diagnoses. But in no other way can progress be made except by facing the situation squarely and relegating to the past our present hyper-conservative attitude. To many, my ideas on this subject as here expressed may appear radical and extreme; I believe, however, that the time has come when radical measures must be taken to detect this disease in its early stages and that in tuberculosis work errors of commission are far preferable to those of omission. Above all things I wish to emphasize that it is not the examination of the chest alone, but the prolonged and careful study of the patient himself and his history past and present, which will lead to early detection of the disease, and that were the stethoscope used less and the thermometer and common sense used more, there would be fewer mistakes.

Chapter I

CLASSIFICATION OF CASES

Physicians are asked to group their cases of consumption according to the classification adopted by the National Association for the Study and Prevention of Tuberculosis. This is as follows:

Definition of Terms. Classification of Cases.

Incipient.—Slight or no constitutional symptoms (including particularly gastric or intestinal disturbance or rapid loss of weight). Slight or no elevation of temperature or acceleration of pulse at any time during the twenty-four hours.

Expectoration usually small in amount or absent.

Tubercle bacilli may be present or absent.

Slight infiltration limited to the apex of one or both lungs or a small part of one lobe.

No tuberculous complications.

Moderately Advanced.—No marked impairment of function, either local or constitutional.

Localized consolidation, moderate in extent, with little or no evidence of cavity formation; or infiltration more extensive than under incipient.

No serious complications.

Far Advanced.—Marked impairment of function, local and constitutional.

Marked consolidation of an entire lobe,

Or disseminated areas of beginning cavity formation,

Or serious complications.

This classification has certain evident disadvantages especially as regards the incipient and the moderately advanced case. There are three groups of patients each

of which may justly be called incipient, and yet differ so widely from one another as not to belong in the same class. In the first group may be placed patients with a definite though slight infiltration or consolidation of one lung, but with only the slightest sign of any constitutional disturbance, as shown by loss of weight, fever, etc.; in the second group fall those patients in whose lungs no definite lesion can be found, on whose records are so often seen the words "suspicious right apex." The diagnosis here is based on general signs and symptoms. The third group consists of children under fifteen years of age who rarely have any actual pulmonary disease, but by X-ray and other means are found to have enlarged bronchial glands, and who show evident signs and symptoms of a general constitutional disturbance. In my own work I use for my incipient cases a classification somewhat as follows:

1. Incipient.

Class A. Signs and symptoms chiefly constitutional, as shown by slight loss of weight and strength, slight fever and elevation of pulse. Signs in the lungs slight or absent. Tubercle bacilli absent.

Class B. Signs and symptoms chiefly local and referred to the lungs. Slight infiltration or consolidation of one apex. Constitutional signs or symptoms very slight or absent. Tubercle bacilli usually absent.

Class C. Children fifteen years old or under. No signs of infiltration in the lungs. Evidence of enlarged bronchial glands usually present. Constitutional signs and symptoms as shown by debility, pallor, loss of weight, etc., usually present.

I have found this classification of distinct service and am of the opinion that one similar to this must soon come into general use.

In the majority of our leading medical schools the subject of tuberculosis receives scant attention. Students are still taught that in order to make a definite

diagnosis of pulmonary tuberculosis there must be bacilli in the sputum or marked evidence of a consolidation in the lungs as shown by dullness, bronchial breathing, increased vocal and tactile fremitus and rales. That a diagnosis can and should often be made without a positive sputum and without many of these signs in the chest is rarely brought to their attention.

Bacilli in Sputum Usually Means Advanced--No Longer Incipient--Tuberculosis.

This is an unfortunate state of affairs. We can never hope to handle tuberculosis successfully until every physician and every medical student realizes (as many of the public now do) that the all-important points in the diagnosis of early tuberculosis are not bacilli in the sputum, nor definite signs of an active process in the lungs, but constitutional signs and symptoms which show only too clearly, were they but correctly interpreted, that the patient is sick. A diagnosis to be an early diagnosis must be made before there is breaking down of tissue with bacilli in the sputum; in most cases a positive sputum means moderately advanced tuberculosis and that many of the patient's chances of cure are already gone. At present great efforts are being made to isolate and segregate the advanced consumptive, but such efforts will be of little avail unless patients are discovered and *put under treatment* when in the incipient and curable stages, and a check thus put to the large number of consumptives who each year fall into the advanced class.

The following chapters will take up the history and physical examination of the patients, laying special stress on the importance of general signs and symptoms in diagnosis.

Chapter II

HISTORY OF PATIENT

Need of a Routine Procedure.

An orderly routine procedure in questioning and examining the patient is of the utmost importance. To facilitate this, many physicians, including myself, find it convenient to use a card of pocket size on which is taken the preliminary history of the patient. This can be transferred to the permanent records later. These cards are particularly useful in seeing patients at the bedside or anywhere away from the office. This card system may have certain disadvantages in that the physician is apt to limit himself to the questions asked on the card and to omit others of great importance; properly used it is of distinct assistance. A simple form of these cards is here given:

POCKET HISTORY CARDS

FRONT.

Name Date
Address
Age S.M.W. M.F.
Occupation
Complains of
F.H.
P.H.
Habits Cta
Max. weight When Pres. weight
P.I.

Cough Sputum + − Not ex.
Fever Hem. Pleurisy
Strength Appetite Bowels
Sleep Pain Complication

Previous Treatment

BACK.

Physical Exam.

T. P. W'ght Resp.
Hgf. Bl'd. Pr. Sputum
Urine Throat Larynx
Heart
Abdomen
Glands
Other complications
Does patient look sick?

Physical development

Lungs
Anterior
Rt. Left
Posterior
Rt. Left
Rx.

In dealing with tuberculosis the basis on which correct diagnosis rests is a careful, thorough, detailed history of the patient and his family, occupation, habits and surroundings.

Family History of Patient.

At the present time there is a strong but mistaken tendency to discount heredity as a factor in tuberculosis. While rarely, if ever, is the disease itself transmitted, it is undoubtedly true and should be borne in mind that certain physical traits are handed down from generation to generation. Among these inherited traits may be a weak constitution, a tendency toward tuberculosis, or rather a lack of resistance against this and other infections. I have recently seen a case of phthisis in a family in which there are five sons all well and strong and four daughters, two of whom have already died of consumption, one is now dying and the other sickly. Such cases as this cannot be entirely explained by direct infection alone; an inherited predisposition on the part of the female members of this family must account for this state of affairs. It is important, therefore, to make such inquiries as to the health and age of parents, paternal and maternal grandparents, uncles, aunts and cousins, as will give the physician a clear idea as to the nature of the material with which he is dealing.

Heredity.

Of greater importance than this is the question of direct exposure to infection from actual cases of tuberculosis in the family. It is not enough to be satisfied with a negative answer to the stock question, "Is there any consumption in your family?" The physician should inquire carefully into the present state of health of each member, the exact cause of death if any have died, and, above all, he should make sure that the disease is not hidden under euphonious terms such as "decline," "chronic bronchitis," "weak

Exposure to Disease from Cases in the Family.

lungs," " dyspepsia," " nervousness," " anemia," etc. If there has been a case of consumption in the family it is necessary to find out whether the patient at present under examination was exposed to infection long enough or closely enough to make this a factor in diagnosis. It often happens that a patient gives what seems like a very bad family history, and yet on careful questioning is found to have been remarkably free from any real exposure to the disease.

In the patient's past history the first question should be concerning the acute infectious diseases of early life.

Past History.

Of these measles and whooping cough are most important as regards tuberculosis. Each of these diseases, mild enough in itself, is known to have a tendency not only to awaken latent foci of tuberculosis but to leave the lungs in a weakened and irritated condition and extremely susceptible to fresh infection. Especially if these diseases occur later in life are they apt to be followed by tuberculosis. The course of events, therefore, which followed either of these two conditions, especially if occurring after childhood, should be carefully studied.

Of the diseases and abnormal conditions apt to come later in life there are five which are of special importance as related to a possible tuberculosis. These are (1) " pleurisy "; (2) " influenza "; (3) " bronchitis"; (4) " run-down "; (5) " fever " or " slow fever."

1. *Pleurisy.* All " wet " pleurisies should be considered tuberculous; " dry " pleurisies, unless there is definite evidence they are of rheumatic, pneumonic, postoperative or traumatic origin, should be looked upon as highly suspicious of tuberculosis.

2. *Influenza.* While some cases of influenza are called tuberculosis, the reverse is more often true and leads to far more distressing consequences. A history of " influenza " lasting over three or four weeks and followed by a period of debility and loss of weight and strength,

with or without cough, should be looked upon with grave suspicion.

3. *Bronchitis.* This, the commonest and perhaps most neglected of all pulmonary diseases, is usually a local one and rarely attended by severe constitutional symptoms. A bronchitis which lasts over a month and is accompanied or followed by loss of weight, strength, etc., is open to suspicion as being of tuberculous origin.

4. *"Run-down."* Most of us occasionally get "run down" and are obliged to take a vacation or a tonic or both. It is impossible to say in how many instances the run down condition is really due to the lighting up of a hitherto latent tuberculosis; it is highly probable, however, that in a fairly large percentage of cases this is what has really happened. It is a point in a patient's history of sufficient importance to be worthy of careful consideration.

5. *Fever.* This term, though not so frequently met with now as formerly, is still occasionally used by patients in describing a period of semi-invalidism accompanied by fever due to some unknown cause. It usually means endocarditis, malaria, influenza or typhoid fever; not infrequently such a condition as this closely resembles and may be due to a tuberculous infection.

Tuberculosis Elsewhere in the Body.

Whether a patient has had tuberculosis elsewhere in the body is usually evident on careful scrutiny without questions. Enlarged glands, scars or sinuses in the neck, ankylosed knees, lupus, etc., speak for themselves. It is not safe to rely on this, but far wiser to ask direct questions as to whether or not at any time the patient has had tuberculosis or conditions caused by tuberculosis elsewhere than in the lungs. A positive answer will naturally lead to further questioning and examination as to the nature, extent and outcome of the process.

Among other routine questions which it is well to ask the patient is one somewhat as follows: " Did you consider yourself up to the present time of the strong, rugged and robust type, the thin but wiry type, or were you always rather delicate? " If the patient admits to being in the latter class, one should then inquire as to how often and how long he or she has been confined to bed with minor illnesses. It is astonishing how frequently patients of the " delicate type " state that they have always been free from coughs, colds, etc., and declare that they were " delicate but never sick." Such patients are not necessarily more prone to tuberculosis than the rugged individuals.

Type of Patient.

In inquiring as to the occupation of any given patient it is important to find out not only the trade or profession by which the patient earns his living, but also what he actually does during his working hours. Much has been written concerning the so-called dangerous trades. As far as tuberculosis is concerned those trades are truly dangerous where the patient works under unfavorable conditions, in badly ventilated workrooms or is exposed to dust, iron or stone particles, or irritating fumes. It is perfectly possible for a man working as a granite cutter or in the manufacture of jewelry to take such precautions and to work under such conditions as to render his occupation not dangerous but the reverse. Likewise a person engaged in an occupation usually considered in no way dangerous, may have such long hours or in other ways be so handicapped as to render this trade a really dangerous one. For this reason one should inquire carefully as to the work, the hours of work, the opportunity given for fresh air, rest, meals and for proper vacation. Finally one frequently meets patients in whose family and in whose occupation no exposure to infection can be found, but who on careful questioning will re-

Occupation.

member that a fellow-workman, clerk or stenographer had a bad cough and was careless in regard to sputum.

It often happens that while the conditions under which the patient works are of the best, the situation at home is not so satisfactory. For this reason one should find out exactly what sort of house or tenement the patient lives in and the opportunities for light and air during the hours away from factory and workshop. Furthermore, it is necessary not only for diagnosis but for future treatment to have a clear idea in regard to the bedroom, the number of occupants, the number of windows, whether they are kept open or shut at night, and last, if the windows are kept open, whether or not light and air under any circumstances can possibly get into the room.

Home Surroundings.

There is nothing which will render the body more liable to infection by the tubercle bacillus than the lack of sufficient sleep and nourishing food. It is only too often that one finds that the shop-girl or clerk who has been working hard all day and is in urgent need of nine or ten hours of sound sleep, spends the evening either doing household drudgery or going out to dances and music halls until late at night. Likewise in regard to food, one frequently finds that breakfast is skimped in order to hurry down to the shop or factory, that lunch is a meager affair of tea and pastry, and that supper is the only real meal of the day. These are important etiological factors in tuberculosis and should be carefully investigated.

Food and Sleep.

In addition to the routine questions as to alcohol, tobacco, tea and coffee, the question of syphilis should be carefully gone into. Pulmonary syphilis is not such a rare condition as has usually been supposed and many a so-called consumptive has been cured by iodide of potassium and mercury. In addition there are two other "habits" concerning which inquiry should be made, the "fresh air

Habits of Patients.

habit '' and the '' fresh water habit.'' In other words, it is well to find out whether the patient is one who loves to get out of doors and into the country whenever possible, who likes walking and exercise, or is one who prefers to sit indoors at home; likewise it is important to find out what sort of a bath the patient takes, and whether or not he wakes up the skin, the lungs and the whole body with a cold bath and rub down in the morning. Likewise, the physician should find out in regard to sex habits and the possibility of excesses in this regard.

All the information concerning the patient's occupation, home surroundings and habits obtained in logical and orderly sequence will go a long way in making the final decision as to diagnosis and treatment a correct one.

Finally, then, the important points in the family history, past history, occupation, home surroundings and habits of the patient are as follows:

1. Tuberculosis is not inherited but a weak constitution, lack of resistance or a tendency toward the disease is often inherited.

2. The probability of infection from other cases in the family depends on the intimacy of contact and the length of exposure.

3. Of the children's diseases only measles and whooping cough are of importance, and these especially if occurring in adult life.

4. Pleurisy, influenza, bronchitis, '' run-down '' and '' fever '' are important points concerning which inquiry should be made.

5. Tuberculosis is no respecter of persons. It is naturally more apt to strike weak and delicate individuals but may develope in the strongest and most rugged type.

6. A trade is only dangerous when the conditions under which the work is done are bad. Careful inquiry should be made in regard to the patient's actual working conditions.

7. A patient may work under ideal surroundings yet spend one-third of his life during which he is sleeping under very bad conditions.

8. The physician should inquire not only as to food, sleep, alcohol, tobacco, tea and coffee, but also as to syphilis, sex habits, fresh air and bathing.

Chapter III

HISTORY OF PATIENT (*Continued*)

We next come to the patient's present illness. It is important to get as definite an idea as possible as to when this began. To do this it is better to ask the patient "When did you last feel perfectly well?" rather than the customary question, "When did you first feel sick?" The answer to the first question will usually antedate the second by many months and will be far nearer the truth. With this as a starting-point one should next find out what was the first symptom noticed, and how soon after this the patient consulted a doctor. In many cases the first symptom is found to be a constitutional one, such as loss of strength or energy, fever, etc., rather than one which could be referred directly to the lungs.

Present Illness.

Of all the constitutional symptoms an unexplained loss of weight is the most important, especially when combined with loss of strength and energy. In some cases of early tuberculosis there may be little or no loss of weight; usually, however, there has been a loss even though slight. The maximum weight and its date, the normal weight, which is rarely the maximum, and the present weight should all be ascertained and recorded. In some cases a marked loss can be so satisfactorily explained as to lose all significance. It not infrequently happens that recent immigrants to this country will state that they have lost ten or twenty pounds since their arrival. This does not necessarily mean disease, but is merely the effect of more strenuous living amid strange and perhaps trying

Constitutional Signs and Symptoms.

Loss of Weight.

conditions. Likewise a gradual loss of weight over a period of many years is not of much importance. It is often the case with patients in middle life that they reached their maximum weight ten or twenty years ago, but that this has gradually declined to a point they now regard as perfectly normal. Unless, however, a loss of weight can be satisfactorily explained in some such way as this, it is an important symptom.

Loss of Strength.

Along with loss of weight there is apt to be an unexplained loss of strength; the patient is apt to complain of languor or undue weariness. This combination is of the greatest importance and by itself is sufficient reason for a careful lung examination. The patient may state that he gets tired and out of breath more easily and more quickly than before; that everything is an effort; the legs ache; that it is harder to go upstairs and more tiring to go to and from work than formerly, and (of special significance) that a good night's sleep no longer seems to bring the rest and renewed strength in the morning that was formerly the case. It must be borne in mind, however, that this phenomenon may also occur in many neurotic states. All this should be carefully gone into as possible important points in diagnosis.

Loss of Nervous Energy.

There is no commoner symptom of a tuberculous toxemia than what is described as "loss of ambition and energy." Patients on questioning will admit that without knowing why, they have lost interest in their work and in life in general; that they no longer enjoy living as they did. Often, if the patient himself does not admit it, parents or friends will call attention to the fact that there has been a marked change in temperament; that a patient formerly good-tempered and easy to live with has become cross and disagreeable; that the patient has become nervous, irritable and easily upset by little things. Tuberculosis may not be the cause of these changes; only too

frequently, however, subsequent events prove that it was.

Loss of appetite, a capricious appetite and all sorts of dyspepsias variously diagnosed as hyperacidity, atony, hypomotility, etc., may be the first indication that a tuberculous focus is active somewhere in the body. A loss of appetite particularly for breakfast is common in early tuberculosis.

Loss of Appetite.

Nothing will give the physician more information as to diagnosis, prognosis and treatment than a careful study of the patient's temperature and pulse. These observations should be made under normal conditions at home by some reliable person other than the patient whenever possible. Temperature and pulse taken in a physician's office are notoriously unreliable, but careful records at 8 A.M., 12 M., 4 P.M. and 8 P.M. over a period of not less than four days will give evidence of great value. Whether the thermometer is a one-minute or a three-minute instrument, it should be kept in the mouth full five minutes with the patient at rest. It should be borne in mind that a slight elevation of temperature, fifteen to thirty minutes after meals, is normal in health and that the temperature should therefore be taken before meals or some time after them. It is also important to remember that there is apt to be slight fever just before the menstrual period and during the first two days of it. Slight fever at such a time has not the significance it would otherwise have. If the stethoscope were used less and the thermometer more, fewer mistakes would be made.

Temperature and Pulse.

The importance of any persistent though slight rise in temperature above normal is well known; the equal or even greater importance of a constantly subnormal temperature combined with a rapid pulse, over 100 or 110, has not been sufficiently emphasized. A high pulse

and subnormal temperature, associated with other constitutional symptoms, is of as much importance in diagnosis as a slight degree of fever, and in prognosis of far graver significance. In no other disease are relatively slight variations in temperature so important. Combined with a loss of weight and strength and other suspicious constitutional symptoms, a slight afternoon fever up to 99.2° or 99.4°, or a constantly subnormal temperature with rapid pulse may be considered as almost pathognomonic of a tuberculous infection and justifies a positive diagnosis *whether or not definite signs are found in the lungs.*

Pallor does not always mean anemia. The hemoglobin should be taken in every case and if found to be seventy per cent or lower may be of significance in diagnosis. One occasionally finds a moderate amount of anemia in the early stages. This is sometimes called " tuberculous chlorosis." It is not a true chlorosis, however, nor can it be regarded as a clinical entity, but merely a secondary anemia which is apt to occur in young women with incipient tuberculosis.

Loss of Color.

Flushes and chilly feelings are frequently met with in the early stages of the disease. Actual chills and night sweats are rare. In the early stages these phenomena simply show an unstable and irritated vasomotor apparatus and are of minor importance in diagnosis.

Vasomotor Disturbances.

Hoarseness due to relaxation of the vocal cords and not to any tuberculous process is not uncommon in delicate patients and is an early symptom.

Hoarseness.

Menstrual irregularities are common but of little diagnostic value.

Menstrual Irregularities.

Among the many constitutional signs and symptoms which careful and systematic questioning on the part of the physician may elicit and

which show that a tuberculous process is somewhere actively at work in the system, the most important are, first, an unexplained loss of weight, strength and nervous energy, and next, a pulse constantly over 100-110 with the patient at rest, with a slight fever or a subnormal temperature with afternoon or evening rise to 99.2° or 99.4°. In the great majority of instances such a combination of constitutional signs and symptoms means tuberculosis and demands radical treatment.

Summary of Important Points.

Chapter IV

PRESENT ILLNESS

SIGNS AND SYMPTOMS REFERRED TO THE LUNGS

THERE is no typical cough of tuberculosis. Cough is usually present in some form or other, however, even if it be merely a slight hack or clearing of the throat in the morning. Any cough which lasts over four weeks requires careful investigation and should be considered as strongly suspicious of tuberculosis. Not infrequently the cough is a dry throat affair, or a mere clearing of the throat which has been considered of no importance by the patient. There may be an intolerable tickling in the larynx which no amount of coughing will relieve. Other causes of a chronic cough, such as enlarged tonsils, dry pharyngitis, etc., must be carefully looked into and ruled out before the cough is definitely set down as due to tuberculosis. A croupy barking or paroxysmal cough is often met with in children with enlarged tuberculous bronchial glands.

Cough.

Frequently there is no sputum just as there may be no cough. A typical tuberculous sputum does not exist. When there is sputum, however, it should always be examined *even if microscopically it appears to consist merely of clear saliva or mucus.* Syrup of hydriodic acid in teaspoonful doses after meals for three or four days will often so loosen up a process as to enable the patient to raise enough sputum for examination. If sufficient effort is made, some sputum can generally be obtained. The patient should be made to understand clearly, first, that the

Sputum.

sputum desired should come from down in the lungs after a cough forced or otherwise, and not from the naso-pharynx, and second, that the medicine given is not for the relief of symptoms but merely to help provide sputum for examination. Unless this is done many patients will not return. In many instances if the importance of the matter is made clear, patients can raise sufficient sputum for immediate examination.

Above all things the physician should bear in mind that a negative sputum examination or even repeated negative examinations does not rule out tuberculosis. A negative sputum should be looked upon as the rule rather than the exception. If the sputum is found positive in the great majority of instances someone is to blame. Either the patient through ignorance or carelessness has not consulted a physician in time, or else the physician has been unable or unwilling to make an early diagnosis on the signs and symptoms then present. The statement that " absence of proof is not proof of absence " applies admirably to this subject.

Negative Sputum Does Not Exclude Tuberculosis.

The oldest and most reliable method of examining sputum for tubercle bacilli is the Ziehl-Nielson method. The technique of this will be found in the Appendix. It is by all means the best for general routine office use.

Methods of Sputum Examination.

The so-called " Antiformin " method depends on the power of a strong alkaline solution to dissolve mucus and all bacteria except those of tuberculosis. " Antiformin " is the commercial name for a saturated solution of equal parts sodium hydrate and sodium hypochlorite. Equal parts of sputum and ten per cent antiformin are mixed, allowed to stand for one-half to one hour, centrifugalized, the sediment washed and stained for tubercle bacilli. It is hardly advisable for the gen-

Antiformin.

eral practitioner to attempt this method unless he has plenty of time and is well skilled in laboratory technique.

Any hemorrhage from the mouth should be considered as definite evidence of pulmonary tuberculosis until proved to be the result of some other process.

Hemorrhage.

The great majority of hemorrhages are due to pulmonary tuberculosis. "Streaked sputum" is of lesser significance than clear blood, but it is still a point of the greatest importance in diagnosis. The patient should always be asked the question, "Have you ever raised any blood, either clear or mixed with the sputum?" If the answer is positive, one should next ascertain whether the blood came when the patient was resting quietly, or whether it followed a severe coughing spell or violent exercise. A hemorrhage usually occurs during or immediately after exercise. It is of all the more importance as a symptom of tuberculosis if it occurs during rest. In female patients the relation to the catamenia should be gone into carefully. Hemorrhages due to tuberculosis are undoubtedly more liable to take place at this time than at any other. The term "vicarious menstruation" is too often used to cover a lack of knowledge on the part of the physician, which may mean disaster to the patient. Enlarged or diseased tonsils are too frequently named as the cause of bleeding. In children this may be the case, but in adults actual bleeding from tonsils is so rare as to be negligible. I vividly recall one patient who consulted me for a slight hemorrhage. There were no signs in the lungs. A throat specialist reported that "blood could be seen oozing from one tonsil." The next day bacilli were found in the patient's sputum and he has since succumbed to the disease.

Decayed teeth and diseased gums are very definite causes of small hemorrhages and streaked sputum. One such patient who gave a history of repeated small hemorrhages and who had been pronounced tuberculous on

this account was entirely cured in body and mind by proper dentistry. Perhaps the most common cause of hemorrhages not due to tuberculosis is a lesion in the nose or naso-pharynx. Frequently a patient wakes up in the morning and spits out considerable blood or bloody sputum which has collected in the back of the throat during the night from a slight abrasion in the nose. In every case of obscure hemorrhage, therefore, the nose, naso-pharynx and throat should be given a most thorough examination. It not infrequently happens that the blood comes up without cough—the patient tasting or seeing it to his utter surprise, without knowing where it comes from.

Chest Pains.

Pains in the chest of obscure origin are very common in both early and advanced tuberculosis as well as in other non-tuberculous or non-pulmonary conditions. In early diagnosis not much significance can be attached to chest pains unless they are definitely localized and are associated with breathing or coughing; under such conditions they are suggestive of an active pleurisy or old adhesion.

Summary.

Of the various signs and symptoms referred to in this chapter as related to the lungs, by far the most important is hemorrhage demanding careful study of its source. Three facts should always be borne in mind; first, that unless there is clear proof to the contrary, a hemorrhage from the mouth should be looked upon as a definite sign of pulmonary tuberculosis; second, that a negative sputum examination in no way rules out a tuberculous process in the lungs; and third, that the physician who waits for bacilli to appear in the sputum before making a diagnosis and instituting treatment is depriving his patient of his best chances of cure.

Chapter V

PHYSICAL EXAMINATION OF THE PATIENT

The physician should not hesitate to place his patient under rigid anti-tuberculosis treatment, even if he finds no signs in the chest, providing marked constitutional signs and symptoms are present. It is not always necessary to tell the patient he has consumption in such cases, but it is always necessary to see that he clearly understands the exact situation and that he appreciates its possibilities and dangers.

General Considerations.

In order to insure a satisfactory examination, every patient should be stripped to the waist, comfortably seated on a low stool in a warm room. No exceptions to this rule of removing all clothing down to the waist should be allowed. At the present time there are very few women who will offer the slightest objection, if the chest is kept covered with a shawl.

Here, as in taking the patient's history, the need of a systematic routine method of examination is very great. Many physicians use diagrams giving the outline of the chest and lungs front and back. Whether this is done or not is largely a matter of individual taste. The best method, in my opinion, is to indicate the general condition of the lungs on a diagram and to enlarge upon it by a written description.

Need of Routine.

The physician should always put down in writing whether or not the patient *looks sick*. The physical development, musculature and the condition of the skin, should be noted. These observations take but a few

seconds and often give important evidence. Proceeding further, the pupils should be tested for light and for any inequality, the mouth, pharynx and teeth inspected and the neck and axillæ examined for enlarged glands. Long eyelashes and a skin covered with downy hair are points of minor importance.

General Impression of Patient.

Much has been said of the so-called phthisical chest and its various striking characteristics. In the early stages there is no one form of chest particularly characteristic of this disease. The general contour should be noted, particularly as to asymmetry and as to whether or not there is any lagging in the movements of one side compared with the other, or a slight shoulder droop on the affected side. Other minor points, such as prominence of the clavicles, especially of one clavicle and the consequent deepening of the supra- and infra-clavicular fossæ, should be looked for. As a rule inspection of the shape and contour of the chest itself gives but little valuable evidence; it is part of a routine examination, however, and should never be omitted.

Inspection of Chest.

If properly performed by those skilled in the proper technique and able by long experience to detect slight variations from the normal, percussion may be of great value in the diagnosis of early cases. Finger to finger percussion will give better results than the use of hammer and plexímeter. As every person has a definite percussion note, normal for that person, though perhaps radically different from the normal note for another person, it is important to percuss first over what is believed to be sound lung, in order to get the particular note normal for that individual patient. Having done this, the chest should be carefully gone over, front and back, every effort being made to percuss on exactly corresponding points on each side of the chest. In early processes there is rarely any

Percussion.

real dullness, but only a slight diminution of resonance, a shortening of the note, higher pitch and a feeling of resistance under the finger. Often there is absolutely nothing abnormal to be discovered by percussion. Indeed there may be hyper-resonance over the diseased area so that it is often difficult to tell which is the affected side. Over the front, where the chest wall is not so thick, light percussion will give the best results; posteriorly, especially in fat or muscular people, heavy percussion is necessary. The percussion note over the right apex is normally shorter and higher pitched than over the left. This and the other features of what is called the " physiological right apex " are to be explained by certain definite anatomical peculiarities of this region, as conclusively demonstrated by the work of Fetterhoff and Morris.* As a general thing it is rare that in early cases any very striking evidence is given the physician as a result of percussion alone.

Auscultation is of paramount importance in the diagnosis of early tuberculosis. This is the most delicate physical means we have of recognizing this disease. Here again, however, the physician should bear in mind that in early cases marked variations from the normal will not be found, and that failure to find any definite localized lesion as shown by this most delicate of tests, auscultation, does not in any way prove that the patient has not tuberculosis. One should make sure that the patient has not a perforated septum or other deformity in nose or throat which might alter the breath sounds. The patient must first be given careful instruction how to breathe. The mouth should be slightly open, to avoid adventitious sounds from the nose; the chest should first be gone over with the patient breathing quietly and normally. Often in the case of women it takes considerable time to per-

Auscultation.

* *American Journal of the Medical Sciences*, Vol. CXLIII, No. 5, May, 1912, p. 637.

suade the patient to breathe deeply enough so as to be audible and yet not so violently as to bring into play the accessory muscles of respiration. After every portion of the chest has been gone over with the patient breathing quietly, it should next be re-examined with the patient taking deep breaths, and finally, no chest examination can be considered complete unless the patient is instructed to give a short cough immediately followed by inspiration and expiration. While examining the front of the chest the arms should hang loosely at the sides; they should be held above the head when the axillary regions are being examined, and while listening over the back the patient should place each arm on the opposite shoulder with the head bent slightly forward. The apices, supra- and infra-clavicular and interscapular regions are the most important places to examine. If the skin is very rough or hairy, the bell of the stethoscope and the skin should be wet in order to avoid extraneous sounds. Some physicians prefer to use cold cream or vaseline for this purpose. The physician should always remember that deep breathing, especially coughing followed by deep breathing, is very hard work, and that the patient should be given ample opportunity for rest during the examination.

Bronchial breathing is usually absent in early cases; rales, or fine crepitations may or may not be present; often a cough will bring them out. Usually they are absent. While there is no auscultatory phenomenon which by itself is pathognomonic of tuberculosis, if, however, constant localized rales are found at one apex or elsewhere, associated with constitutional signs and symptoms, it is justifiable to consider the case as one of tuberculosis and to treat it as such until the contrary is proved. This will rarely happen. The changes present in early cases usually consist of slight modifications in normal pitch, intensity and duration of the inspiratory murmur.

Perhaps the earliest abnormality to be detected by auscultation is a high-pitched inspiration with or without interruption in it; this is often followed by an abnormally prolonged high-pitched expiration. "Rough" breathing is a term which to many physicians means but little; to me, however, "rough breathing" compared with the normal soft, breezy murmur, is a very real and important point. It is best described as a respiratory murmur which is almost but not quite accompanied by fine rales; so much so that in certain cases the patient is asked to take breath after breath in the expectation that rales will be heard in the next inspiration. It should not be, but often is, confused with "harsh" or "puerile" breathing normal in children.

Little is to be gained from vocal fremitus especially in women. In early cases the pathological process is rarely such as to admit of any marked abnormalities in the vocal fremitus. Whispered voice, however, which is in reality only an increased and forced expiration, is of far greater value and in the case of women and children may well replace the use of the spoken voice. A high-pitched, intense whispered voice, along with other slight signs, is an abnormality of distinct importance. Transmission of heart sounds if to the right apex is important; not if to the left apex. Except as mentioned above, interrupted or cog-wheel breathing is not of great significance. It is often confused with muscle sounds. Prolonged harsh expiration is not one of the earliest changes but is apt to be one of the first the physician finds. Hence it is of value.

Vocal Fremitus.

Tactile fremitus rarely gives much help in the diagnosis of early pulmonary tuberculosis. The relation of pleurisy to pulmonary tuberculosis has already been mentioned in a previous chapter.

Palpation.

Many signs are described, to each of which the

enthusiastic writer, whose name is apt to be attached to the sign, and his followers, attribute great importance. In a few rare cases such signs may be present, and if present may be of value. In most instances the personal equation is so large and the practice needed to elicit the sign is so great as to minimize its importance. It can be safely said that no single sign or group of signs can ever replace or equal in importance the knowledge to be gained from a careful, thorough examination of the chest as outlined above. Among the various refinements in chest examination and the most important "signs" are:

Refinements in Chest Examination.

(*a*) Chest mensuration and the use of the spirometer. These are interesting procedures but are not apt to give much evidence of value except in the hands of specialists and those long accustomed to their use.

(*b*) The percussion of the apical isthmus as described by Kronig; the percussion of the outline of the apices behind and the excursion of the diaphragm below. Here again the personal equation is so great in following out these procedures as to largely prevent the obtaining of accurate or trustworthy results in the hands of busy general practitioners. It is difficult to imagine anything in percussion which requires more skill in technique than this. In my opinion the results obtained are rarely of sufficient value to repay the labor expended.

(*c*) *Ewart* has described a lozenge-shaped area of dullness in the back between the scapulæ as an indication of an early pulmonary process. My experience has not shown this sign to be of value.

(*d*) *Pottenger* has written at length describing spasm and rigidity of the chest muscles as evidence of an inflammatory process underneath. While in skilled and practiced hands it may be possible to obtain certain information from this phenomenon, it has not met with sufficient confirmation to be recommended as a routine procedure except in the hands of specialists.

Aside from a slight degree of secondary anemia, there is little or no evidence of importance to be gathered from

a detailed blood examination. The blood pressure is apt to be low as might be expected. The urine is usually negative, though it should always be tested for albumin and sugar as a part of a regular routine. The diazo reaction has no significance. Tubercle bacilli occur too infrequently in the urine to make worth while a search for them; this likewise applies to the stomach contents and stools, in each of which bacilli can occasionally be demonstrated. The carrying out of such tests is a laboratory procedure and not one which is suitable for general practitioners. The estimation of the tuberculo-opsonic index as a means of diagnosis is not accepted in this country, nor is the serum diagnosis of Arloing and Courmont.

Other Diagnostic Points and Their Value.

The points to which most attention should be paid in the physical examination of the patient are, first, that it is not only a pair of lungs which is being examined, but a human being who may or may not have tuberculosis in his lungs; too many physicians when they fail to find in the lungs definite evidence of disease become utterly oblivious to fever, loss of weight, strength and energy, and the fact that the patient is really sick. Second, that a definite, orderly routine method of examination is necessary to get accurate results; third, that it is not by any one particular sign or detailed method of examination, but by careful auscultation and percussion, particularly the former, that valuable evidence is to be obtained; and, finally, that it is perfectly possible for the patient to have pulmonary tuberculosis without any definite signs in the lungs.

Summary.

Chapter VI

ADVENTITIOUS SIGNS NOT DUE TO PULMONARY DISEASE

In not a few instances certain sounds may be found on listening to a chest with a stethoscope closely resembling crackles, rales or rubs, which really are not due to any pulmonary disease but to some other cause. The important causes of such sounds are as follows:

Marginal Sounds.

Occasionally over the bases of the lungs, especially in the axillary regions, are heard friction-like sounds or crepitation, due, it is said, to the lung peeling away from the diaphragm. These are called marginal sounds because they are only heard at the edges or margins of the lungs. They are not associated with any evidence of disease. This phenomenon is so rare as to be negligible.

Muscle Sounds.

In thin, nervous young men, and less often, women, muscle sounds are sometimes so loud as to cause confusion. These sounds resemble a low-pitched rumble or roar. While only very rarely do these sounds resemble rales, not infrequently they are sufficiently in evidence to render it difficult to hear what other sounds, rales or otherwise, may be present. One type of these sounds can be still heard when the patient is not breathing, and in this way may be easily distinguished from rales; another type is heard at the end of forced inspiration with muscular effort. Concentration during breathing on the part of the physician, and avoidance of too deep breathing by the patient, should prevent mistakes due to this cause.

F. T. Lord has described a peculiar grating sound occasionally heard in the back, which to a greater or less degree resembles a friction rub. This is due to a roughening of the surfaces of the subscapular bursæ or to nodulated muscles. If this sound occurs on moving the shoulders up and down without breathing, any pulmonary lesion can be at once ruled out. This condition is too rare to be of much importance.

Bursal Sounds.

Ewart has called attention to "motor joint crackles" as a frequent cause of wrong diagnosis. Perez originally described this phenomenon which bears his name. It is a well-known fact that auscultation over any of the larger joints will on movement reveal sounds which very closely resemble fine, dry rales; this is particularly true of the shoulder joint. Such crepitations can often be felt as well as heard. They are not so common in children. These crackles are often transmitted along the clavicles and can usually be distinctly heard over the upper part of the sternum, and in many cases over the apices, front and back. In a few instances, particularly among women, who on breathing bring their shoulder muscles involuntarily into play, distinct rales are heard at one or both apices, which are really motor joint crackles due to the slight movements of the acromio-humeral, and the sterno-clavicular joints. In any suspected case the patient should be instructed to go through the motion of breathing without taking any air into the lungs. If the sounds still continue they are not true rales but motor joint crackles. This phenomenon, though rare, is of sufficient importance to be borne in mind in any chest examination.

Joint Sounds.

In listening to the chests of stout women beyond middle age, or in other persons who breathe superficially from habit or weakness, especially in old and bed-ridden patients, it is not unusual to hear an explosion of crackles after the first deep

Atelectasis.

inspiration or cough. The explanation usually given to account for the rales thus obtained (for they are real rales) is that the air has been driven into certain far corners of the lungs by the forced breathing, to which it does not usually gain entrance, and thereby opens up a certain number of closed alveoli, causing the crackles or fine rales. These are usually heard over the bases of the lungs; they are not constant but disappear after one or two deep breaths. They are most often found in stout women who present no other signs or symptoms of tuberculosis, constitutional or local. These atelectatic rales ought never to be the cause of any mistakes in diagnosis.

Other Sounds Which May Simulate Rales.

Among the other sounds which may simulate rales are those caused by the hair against the diaphragm of the stethoscope if this form of instrument is used. These may be excluded by wetting the skin and stethoscope, or by the use of cold cream or vaseline.

In very stout or very muscular individuals, firm pressure of the stethoscope against the chest will cause certain adventitious sounds, the exact origin of which is doubtful. A careful examiner should not be led astray by any such sounds as these, however.

Chapter VII

TUBERCULIN AND ITS VALUE IN DIAGNOSIS

Tuberculin, carefully used in proper doses and properly interpreted, is free from danger, and may be of great value in the diagnosis of early tuberculosis; in the hands of those not skilled and experienced in its use, however, it can do much harm. The general practitioner will never find it an agent of much value except in the diagnosis of tuberculosis in young children; even here a positive reaction by no means necessarily signifies that tuberculosis is the cause of the symptoms. In practically no case should a diagnosis be based on the result of a tuberculin test alone without other confirmatory evidence, nor should it be used until all other means of making a diagnosis have failed.

In the great majority of cases a positive reaction means that tuberculosis is present somewhere in the body; but in the absence of any focal reaction, i.e., local hyperemia or other signs of renewed activity in the lungs, glands, joints or wherever the suspected focus may be, a positive reaction does not give any information as to whether the tuberculosis is active or latent, old or recent, or where it is located.

A negative reaction likewise by no means proves that there is no tuberculosis, except in the case of young children under five years, and indeed not always then. In the case of adults, a negative reaction may mean no tuberculosis. This is very unlikely, however. It is more apt to mean that the patient has already established an immunity to the disease and therefore no longer reacts to that particular dose of tuberculin. The test

is occasionally negative during or following certain acute diseases, such as measles; finally, a negative reaction frequently occurs in patients who are either so advanced in consumption, or who for some other reason have insufficient vitality to produce anti-bodies to thus cause a reaction. It is of the greatest importance to bear in mind these causes of a negative reaction. Many patients have been lulled into a false sense of security because of a negative tuberculin test.

Among the various methods of using tuberculin for diagnostic purposes, the subcutaneous test is by all means the most reliable; it is also the most difficult to carry out properly and to interpret correctly. The patient should be in bed in order to get satisfactory results. The test should not be given where there is over one-half degree of fever, where there has been recent hemorrhage or where renal tuberculosis is suspected. The initial dose should not be over .1 mg. of Koch's old tuberculin; the second dose, in case there is no reaction to the first in forty-eight hours, should contain 1 mg., and the third, which is not usually necessary, 10 mg. Patients should be kept in bed during the forty-eight hours following each injection. This should be given in the late afternoon so that the patient need not be disturbed during the night for purposes of temperature taking. Temperature and pulse should be recorded for two days every two hours when possible. Signs of a focal reaction,—local hyperemia or other signs of activity in the suspected part, such as increased cough and sputum, increased pain, redness or swelling in glands, joints or elsewhere,—or a local reaction, swelling, redness and pain at the point of injection are more important and less subject to error than constitutional disturbances.

The cutaneous tuberculin reaction is perfectly safe and is easy to apply; a positive or negative result in adults is, however, of far less significance than the subcutaneous test. The form of test most frequently used is that first

described by Von Pirquet, whose name is frequently attached to this method. It consists in scarifying the skin of the upper arm with a needle, lancet, or other instrument under aseptic precautions and rubbing in with the instrument a drop of Koch's old tuberculin; another vaccination should be made at the same time above the first, using sterile water instead of tuberculin in order to be able to compare the two scarifications and to rule out any abnormal inflammatory reaction. The scarification should be deep enough to bring out serum but not blood. Excess of fluid should be drawn off and the rest allowed to evaporate. No dressing is needed.

Skin Tuberculin Reactions.

There are various degrees of a positive reaction, from a small indurated red spot not over ½ inch in diameter to a large inflamed area 1 to 1½ inches in diameter, red and occasionally covered with yellow blisters. A modification of this test is the intra-cutaneous test, whereby a small amount of diluted tuberculin is injected with a syringe not underneath the skin but into the skin itself. The third method consists of rubbing into the skin some ointment to which a certain amount of tuberculin has been added. This is the Moro ointment test. Neither this nor the intra-cuticular method has any advantage over the simpler Von Pirquet skin test.

A few years ago Calmette described the ophthalmic tuberculin reaction. This consists of introducing into one conjunctival sac a few drops of dilute tuberculin. A positive result is striking but often annoying to the patient, and occasionally the cause of permanent injury to the eye. Practitioners are advised not to use this method.

The Ophthalmic Reaction.

The sub-cutaneous tuberculin test, applied under proper conditions and interpreted by one skilled and experienced in its use will give valuable and trustworthy evidence as to the presence or absence of tuberculosis somewhere in the body; in case of a local reaction in the

lungs as shown by increased rales, cough and sputum, it may give evidence as to the presence of active pulmonary tuberculosis. On the other hand, if performed by those not skilled in its use, it is capable of doing great harm not only by lighting up old quiescent processes, but by a wrong interpretation.

Value of Tuberculin in Diagnosis.

The Von Pirquet cutaneous test is of undoubted value in children, especially those under five years. The older the patient the less the significance of this test, so that in adults very little value in diagnosis can be attached to it. As a general thing it is safer to leave these tests to those who have made them a special object of study. No form of tuberculin test will ever equal or approach in value the evidence gained by a careful history of the patient and a detailed, painstaking physical examination.

Chapter VIII

THE X-RAY IN EARLY DIAGNOSIS

X-ray in Adults.

The X-ray, like the tuberculin reaction, when correctly interpreted by an expert, and by the expert who is broad-minded enough to realize the limitations of his specialty, may furnish valuable evidence of early tuberculous disease in the lungs. It can never take the place of careful questioning and thorough examination of the patient by the clinical methods previously described, and should always be looked on rather as an addition to the standard methods of examination than as a substitute for them. In the majority of cases a diagnosis of incipient tuberculosis can be made far earlier by ordinary methods than by the X-ray.

The great disadvantage of the X-ray in diagnosis is that by this method alone it is rarely possible to differentiate an old healed non-active process from an acute active process. In adults the fluoroscopic picture of many apparently normal lungs will show certain areas of increased density, certain shadows or striations which the Roentgenologist may well and truthfully declare to be evidence of tuberculosis; but neither he nor anyone else from the X-ray plate or fluoroscopic screen alone can tell whether or not these abnormalities are of recent origin and the cause of present symptoms. In addition to this is the fact that in early tuberculous processes, the pathological changes in the lungs are of the slightest and such that only the most careful scrutiny will reveal. These the X-ray cannot be expected to show.

Such are the limitations of the X-ray in the diagnosis

of early tuberculosis. A diagnosis of incipient tuberculosis based on this method alone is practically worthless; a diagnosis based on evidence of constitutional disturbances and local signs in the lungs, which is confirmed by evidence of increased density and abnormal shadows in the suspected area as interpreted by an expert is apt to be a correct one. When the question is not whether there is or is not a tuberculous process in the lungs, but whether or not a given process is due to tuberculosis or some other cause, the X-ray can give valuable evidence, particularly as to size and extent of the pathological changes.

X-ray in Children.

While in adults, then, the X-ray only adds a certain amount of confirmatory evidence in diagnosis, and rarely gives any definite or conclusive evidence on which a decision can be based, in children the case is far different. Here the primary tuberculous infection is in the glands around the root of the lung, the bronchial or tracheo-bronchial glands. These glands must reach large size before they will produce much substernal dullness, enlarged superficial chest veins, dyspnœa or other striking signs and symptoms. The X-ray is of the greatest value in detecting the presence of these glands and will demonstrate them far earlier and better than any other method. If, in addition to constitutional signs such as anemia, loss of weight, languor and debility, as will be described in a subsequent chapter, and a positive Von Pirquet tuberculin reaction, a child is shown by means of the X-ray to have enlarged bronchial glands, particularly if these are shown in the lateral as well as antero-posterior position, the diagnosis of tuberculosis can be made with certainty and the child put under rigid treatment with an excellent prospect of rapid improvement and ultimate recovery.

What, then, is the just conclusion to come to in regard to the use of X-rays by general practitioners as an aid

in the early diagnosis of tuberculosis? In adults the X-ray may give a certain amount of confirmatory evidence, but never enough on which alone to base a diagnosis; in children, if in addition to constitutional signs of a tuberculous toxemia, X-ray examination shows the presence of enlarged bronchial glands, the diagnosis of tuberculosis should be made and proper treatment instituted. X-ray evidence, to be of value, must be based on expert interpretation. This few general practitioners are able to do. It is far wiser for them to obtain this evidence from those trained in the subject and to add it to clinical evidence which they have already accumulated.

The General Practitioner and the X-ray.

Chapter IX

THE DIAGNOSIS OF INTRATHORACIC TUBERCULOSIS IN INFANCY AND CHILDHOOD. BRONCHIAL GLAND TUBERCULOSIS

The term "intrathoracic" is used advisedly in place of "pulmonary" in speaking of the early diagnosis of this disease in childhood. By the time the lung itself is involved, the first stage is already passed. The disease must be recognized before it is actually pulmonary.

Tuberculosis in childhood presents certain features which are radically different from those found in the same disease in adults. Post-mortem findings have shown beyond a doubt that by the time the fifteenth year is reached at least fifty per cent of children, and probably a considerably larger percentage, are already infected with the tubercle bacillus. Bearing this fact in mind, then, it can readily be seen how important it is to recognize the signs and symptoms of this disease at the earliest possible moment. It is important to remember in the case of many children that a mild tuberculous infection may cause no symptoms whatsoever. There is a vast difference between "tuberculous infection" and "tuberculous disease." The following statement from Pritchard * puts the matter so well as to bear repeating: "Tuberculosis is the commonest of all diseases to which childhood is liable. The congenital form of the disease is practically unknown, although the phthisical diathesis is strongly hereditary and predisposes to the subsequent development of tuberculous processes."

* Pritchard, E. *Practitioner*, Vol. XC, No. 1, January, 1913.

"The incidence rate rises from zero at birth to ninety per cent at the age of 14. Although tuberculosis is a terribly fatal disease during the first few months of life, the mortality rate among those affected rapidly falls to about two per cent at the end of the fourth year. Thus, as far as tuberculosis is concerned, children may be said to be highly susceptible, but with the exception of the first two years of life, little liable to fatal results."

As above stated, tuberculosis in childhood presents certain features which are radically different from the same disease in adults. Most important of these is the comparative rarity of active processes in the lung itself, especially at the apices, the usual location in adults, and second, the great frequency of bronchial gland involvement. Tuberculosis in childhood is essentially a disease of the lymphatic system. By the time the lung is involved, as stated above, the process can no longer be considered an incipient one, and will be only too evident. These points should be constantly borne in mind in examining children. Here, as in adults, the importance of constitutional signs and symptoms cannot be given too much emphasis. In the absence of expert X-ray evidence, it takes a very keen and experienced observer to diagnose bronchial glands from an examination of the chest alone. Such diagnoses are rarely justifiable unless confirmed by general signs and symptoms. These symptoms may be as follows:

(*a*) Loss of weight, or, of greater importance, a failure to gain weight;
(*b*) Malnutrition, despite what seems to be adequate and proper nourishment;
(*c*) Continuous fever;
(*d*) Anemia;
(*e*) Debility, languor, undue fatigue, irritability and loss of appetite.

While the above-named conditions may be due to causes other than tuberculosis, such as rickets, chorea, endocarditis, improper feeding, etc., as a general rule such causes if present at all are strikingly evident. When these con-

ditions exist *without apparent cause,* even if the signs in the lungs are slight or absent, it is safe to make a diagnosis of tuberculous infection. When, in addition to these general signs, certain signs and symptoms referred to the lungs are present, the diagnosis is conclusive. The signs and symptoms referred to the lungs may be:

(*a*) Cough, usually dry and throaty, often of brassy quality and paroxysmal in nature, without sputum, and without obvious cause, such as enlarged tonsils, naso-pharyngitis, etc.

(*b*) Impairment of resonance at the level of the second intercostal space in front and in the interscapular region behind. The possibility of an enlarged thymus or a dilated or hypertrophied heart must be borne in mind and, if possible, ruled out. The latter usually is self-evident. An enlarged thymus, however, may offer one of the most difficult problems in the field of diagnosis. It is only by expert X-ray examination and by careful consideration of constitutional signs and symptoms that this can be ruled out. Sometimes it is impossible to do this.

(*c*) Bronchial breathing and bronchial whispered voice heard on auscultation over the vertebræ below the seventh cervical spine. This is known as D'Espine's sign. It is present only when the mass of glands is fairly large. As these glands are usually confined to the anterior mediastinum they do not cause the dullness and changes in quality of the voice or breath sounds posteriorly unless of considerable size.

(*d*) Signs of intrathoracic pressure such as enlarged superficial veins on the chest, unequal pupils, hoarseness, paroxysmal " brassy " cough, dyspnœa, sibilant inspiration or inspiratory stridor heard over both lungs due to pressure on the trachea, defective air entry in one lobe due to pressure on a bronchus.

(*e*) In addition to the above, the presence of enlarged tuberculous glands in the neck, axillæ or elsewhere would suggest the possibility of similar infection of the glands at the root of the lung.

Tuberculin in Diagnosis.

It is in children that the tuberculin tests find their greatest field of usefulness. The cutaneous test is by far the best to employ. The details of the technique have been described in an earlier chapter. In children five years or under a positive cutaneous test is definite evi-

dence of a tuberculous focus somewhere in the body. A positive test along with constitutional signs and symptoms as enumerated above, with or without signs in the lungs, justifies a definite diagnosis of tuberculosis which requires prompt and aggressive treatment.

The Value of the X-ray in Childhood.

The X-ray, like the tuberculin test, is of far more value in diagnosing tuberculosis in children than in adults. While it is only in comparatively advanced cases that tuberculous bronchial glands are of such size as to produce marked dullness and other striking signs, a careful X-ray examination made and interpreted by an expert will show such glands long before they have attained great size, although quite capable of producing marked constitutional symptoms. In every case, therefore, where there is any suspicion that tuberculosis may be the cause of symptoms, general or local, a tuberculin test and a careful X-ray examination should be made.

The diagnosis of bronchial gland tuberculosis in infancy and childhood must therefore be largely based on a careful study of the following points valued in the order given:—

(*a*) Constitutional signs and symptoms;
(*b*) The cutaneous tuberculin reaction;
(*c*) X-ray examination;
(*d*) Signs and symptoms referred to the lungs.

Chapter X

CONDITIONS WHICH MAY SIMULATE TUBERCULOSIS

There are certain conditions which may closely resemble early pulmonary tuberculosis, not only as to symptoms and constitutional signs, but also as to physical signs in the lungs. The physician should bear in mind, therefore, the possibility of such conditions and should carefully rule these out. Of still greater importance, however, is the fact that tuberculosis is infinitely more likely to be the cause of symptoms than any of the other conditions here considered, and that the patient should be treated *as if he had consumption* until the contrary is proved. Such treatment can do no harm and may do an immense amount of good, no matter what may turn out to be the true nature of the sickness. Such treatment, when the diagnosis is still uncertain, need not include breaking up the home and sending the patient to a sanatorium, but it should include fresh air, rest and proper hygiene at home.

Influenza.

One of the diseases most frequently mistaken for pulmonary tuberculosis is influenza, chronic or acute. The sputum is more or less characteristic, usually a thick, creamy, greenish pus which on repeated examinations shows no tubercle bacilli but many influenza bacilli within and without the leucocytes. The location of the process may be in the apices but is far more apt to be at the base of the lung. The constitutional symptoms may be identical with those of tuberculosis, although there is not apt to be so great or progressive a loss of weight.

Influenza should be suspected in any case where there are definite signs in the lungs, consisting of rales with or without dullness and changes in voice or breath sounds, where there is purulent sputum constantly free from tubercle bacilli and where the constitutional symptoms do not progress and do not seem to be as marked as is ordinarily the case in tuberculosis with so definite or extensive a process in the lungs. The X-ray may show bronchiectasis.

Syphilis.

Hepatic, splenic or pulmonary syphilis, from the signs and symptoms alone, often cannot be differentiated from tuberculosis. The diagnosis must rest on a history of luetic infection, signs and symptoms of syphilis elsewhere, marked pulmonary lesions or unexplained hepatic or splenic enlargement, and a positive Wassermann reaction. It will rarely cause confusion in the diagnosis of early pulmonary tuberculosis.

Neurasthenia and Debility.

Neurasthenia and debility, or what is generally called "being run down," are diagnoses far more apt to be substituted for tuberculosis than the reverse. In many such cases a deep-seated focus of tuberculosis is the real cause of the debility or neurasthenia. Undoubtedly a certain proportion and perhaps a large proportion of those patients who get "run down" every spring after a hard winter's work, or in the fall after a summer without vacation, are suffering with a slight recrudescence of a latent tuberculous process. Treatment is the same, and varies only in degree, whatever may be the cause. In many instances tuberculosis can never be entirely ruled out. The absence of grave constitutional disturbance and of any signs in the lungs, and the short or non-progressive course of the symptoms would tend to eliminate tuberculosis. Such patients should be kept under observation for a long time. The burden of proof that the disease is not tuberculous rests solely with the physician.

Tuberculosis may cause a certain amount of secondary anemia, which sometimes in young women resembles chlorosis. It is only in rare cases, however, that true chlorosis will be mistaken for early tuberculosis. The peculiar color of the skin, characteristic blood changes, absence of loss of weight or any pulmonary signs, are usually enough to establish a definite diagnosis of chlorosis. In addition to this the rapid improvement with iron is usually conclusive evidence against tuberculosis.

Chlorosis.

A typical case of exophthalmic goitre is unmistakable. Mild "fruste" cases, however, may resemble early tuberculosis in almost every detail. Only by the closest observation for the characteristic tremor, a marked and persistent tachycardia, vasomotor and ocular disturbances, and the general preponderance of nervous phenomena over the physical can the diagnosis be made and tuberculosis ruled out. Loss of weight, strength, evening fever and many other symptoms found in early tuberculosis may be found in this condition.

Thyrotoxicosis or Exophthalmic Goitre.

A focus of concealed pus will usually give some indication of its presence either in the patient's history, careful physical examination or by a polynuclear leucocytosis. A perinephritic abscess, a prostatic abscess, chronic suppuration around a tooth or tonsil, pyelitis, a mild, chronic appendicitis or salpingitis in rare instances may cause such constitutional disturbances as to give rise to grave suspicion of tuberculosis.

Sepsis Concealed.

Pulmonary or pleural neoplasms usually will cause little difficulty in diagnosis as far as *early pulmonary* tuberculosis is concerned. Pressure symptoms, bloody sputum or, on aspiration, a bloody chest fluid, hard, non-suppurating glands in axillæ or neck, the possibility of a metastasis from the breast or elsewhere, along with grave and pro-

New Growths.

gressive constitutional symptoms, will generally make the diagnosis clear. The X-ray will give valuable additional evidence.

Actinomycosis usually presents characteristic and unmistakable features, especially in the sputum. While in the very early stages it might be mistaken for tuberculosis, cases are so rare as to render this possibility an unimportant one. But especially if there is an actinomycotic process elsewhere, the physician should consider the possibility of a pulmonary infection, if cough, expectoration and other suspicious symptoms arise.

Actinomycosis.

In the case of children, diseased tonsils, endocarditis, pyelitis and chronic intestinal indigestion are the chief conditions which at times may simulate tuberculosis.

Chapter XI

THE PROGNOSIS OF EARLY TUBERCULOSIS

Prognosis in early tuberculosis depends upon the patient's *ability and willingness to undergo treatment.* It also depends upon the physician's ability and willingness to outline in detail a plan for proper treatment and *to persuade the patient that this is necessary.* Every physician will be asked questions by patients or by relatives or friends first as to the chances of ultimate recovery, and second as to the length of time necessary for a cure. In no case can definite answers be given these questions. It is always unwise to be too sanguine and to raise hopes which may not be realized in regard to a rapid recovery. It is far worse, however, to take away all hope from the patient or to tell his friends that he has no chance of getting better. Each case must be carefully individualized and the various factors in favor of the patient and against him given due consideration.

Ability to Take Treatment.

To cure tuberculosis is usually a matter of dollars and cents. It costs nothing to become infected with tuberculosis, but it costs a great deal to cure it. It is a matter requiring the most serious consideration to break up a home and to send away the breadwinner for six months or a year of enforced and apparently unprofitable idleness. On the other hand, health is the poor man's bank account and stock in trade; without it he is helpless. It is usually a better investment not only for the patient and his family, but also for the community at large, for the patient to give up everything, borrow money and get into debt if necessary, in order to take treatment, than

to keep at his work in the hope, which too often is not realized, that he may throw off the disease. In Massachusetts, although the number of beds in our sanatoria and hospitals is still far from adequate, the financial problem as far as the patient himself is concerned is not a difficult one. If he has no money, he need not pay, nor does he have to become "officially pauperized" to obtain free treatment. In other states the question as to who will pay is always a hard one to answer.

Willingness to Take Treatment.

Marcus Paterson of the Brompton Sanatorium, England, once said to me: "Dr. Hawes, I will not treat nor can I cure alcoholics or damn fools." There is an immense amount of truth back of this striking statement. The incipient and otherwise favorable case who cannot be convinced that he is sick, and who knows far more about the disease than the physician himself, may sometimes get well; usually, however, he suffers the penalty of his own stupidity and goes steadily down hill. On the other hand, the moderately advanced case, who may have quite an extensive process in his lungs, but who is imbued with a spirit of grit and determination, has a far better prospect of permanent arrest if not of absolute cure. In regard to alcohol and other bad or intemperate habits, not only does the bad habit itself, whether it be alcohol, drugs or others, militate against the patient, but also the lack of mental stamina which allowed the patient to contract the habit is a serious factor in the prognosis of the case.

Effect of Previous Treatment.

Whether or not a patient has been under treatment or under favorable hygienic conditions previous to his visit to the physician, and of still more importance, whether or not he has responded favorably to such treatment, are important factors in prognosis. A patient, though in the early stages of the disease, who has been living under the best of conditions at home or elsewhere,

whether or not under a doctor's advice, and who still shows signs of an active process, should have a guarded prognosis; on the other hand the physician may justly feel more sanguine in regard to a patient even if he be beyond the incipient stage, who has been living under bad conditions and without treatment of any kind, providing of course that these conditions can be radically improved. In other words, the patient possessed of inherent power to resist and throw off an infection even if his surroundings are bad, is apt to have a better chance than the more fortunately situated patient who is lacking in this power to control and conquer infection.

Temperature.

A high fever is not necessarily a bad sign; it may represent, as it often does in pneumonia, good resisting power on the part of the patient. A high fever if accompanied by a rapid pulse, especially if present with the patient in bed or at rest, is a very grave symptom.

Loss of Weight.

Loss of weight may be pathological or purely physiological. For this reason it is important to find out what the patient considers to be his normal weight under conditions of health. A progressive loss, despite adequate nourishment, is serious.

Ability to Digest Food.

A good digestion has been called the sheet anchor in the treatment of tuberculosis. As long as the patient has a good appetite, enjoys his food and does not suffer from digestive disturbances the physician need not worry even if other symptoms are less favorable. When, however, in spite of carefully prepared food, in sufficient quantity and daintily served, the patient has no desire to eat, and if he does eat suffers from it afterwards, the physician should be on his guard and should at once cut down on the diet, see that the bowels are thoroughly cleared out and make every effort to bring about a better condition of affairs.

Diminution in cough and in the 24° amount of sputum are distinctly favorable signs, especially if the number of bacilli decreases in proportion. The reverse is not necessarily unfavorable, however. There are many cases in which the patient's general condition undergoes vast improvement so that he becomes practically an arrested case, while cough with a large amount of sputum representing a localized process in the lungs, persists for a long time.

Cough and Sputum.

Discontent, worry and unhappiness are among the most important factors which may prevent the patient's improvement or recovery. Until the causes underlying such a condition can be removed, the patient's chances for cure are slight. In such cases as this it is upon the physician's ability as a psychologist or psycho-therapeutist that the future of the patient may depend.

Psychological Factors in Prognosis.

The important points to consider, therefore, in the prognosis of early pulmonary tuberculosis are as follows:

Summary.

1. Is the patient financially able to take treatment?
2. Is he willing to take treatment and to coöperate with the doctor in every respect?
3. Has his previous method of living, particularly as to alcohol, etc., been such as to increase or lessen his chances of cure?
4. Has he been under treatment previously, and has the disease continued to advance despite such treatment?
5. Has the patient any fever, and if so, what is its relation to the pulse-rate?
6. Are the patient's stomach and digestive system in good condition?
7. Is the patient's temperament one which will chafe under the restraint of rigid treatment?

Chapter XII

TREATMENT OF EARLY PULMONARY TUBERCULOSIS

The treatment of early pulmonary tuberculosis must be prompt, aggressive and prolonged. To be effective there must be close coöperation between patient and physician. Patients demand and have every right to demand a detailed explanation of their case and reasons for all that they are asked to do.

If a definite diagnosis has been made, the exact circumstances should be explained to the patient as well as to some member of the family. It not infrequently happens that either the patient will request the physician to tell no one else about the case, or still more often the friends or relatives will insist that under no circumstances must the truth be told the patient. There are exceptions to every rule. Undoubtedly there are a few cases where requests of this sort should be seriously regarded. It is far wiser and safer, however, that the exact truth, or rather what the physician, after mature deliberation, believes to be the truth, should be told both to the patient and to at least one member of his family. This need not be done harshly or cruelly. In many cases the physician can merely explain that the history, signs and symptoms all point to a slight infection with tuberculosis and that to cure this and prevent further trouble a certain course of treatment is necessary; in other cases where the evidence is clear, even if the sputum is negative, the patient should be told gently but firmly not that he has a "spot on his lungs," "slight lung trouble," or "apical catarrh," but that he has pulmonary tubercu-

losis, or in plain language, consumption. He must never stop here, however. This would give a very wrong impression, and would be anything but the truth. After all, whether or not the physician tells the truth to his patient does not depend so much on what he himself says as on what impression *the patient gets* from what he says. The physician must go further, therefore, and explain in detail exactly the nature and extent of the process, how serious it is, how easily it can be cured if taken in hand at once, and how disastrous will be the results if neglected. Above all things the necessity of *doing something* and *doing it at once* must be emphasized. Aggressiveness is essential; patients must be forced to do certain things, to take certain precautions, even against their will. Errors of commission are many times preferable to errors of omission in the treatment of this disease, for even if the diagnosis turns out to be wrong, the patient has been greatly benefited.

Sanatorium vs. Home Treatment.

In considering treatment itself the question is sure to arise as to whether the patient should go to a sanatorium or should remain at home.

Adults.

In dealing with adult patients it is only in rare instances that home treatment should be advised in place of the sanatorium; if tubercle bacilli are present in the sputum, home treatment should never be allowed unless the sanatorium is absolutely out of the question. As a general rule, the physician should do his utmost to persuade his tuberculous patients to go to some institution, public or private, where the principles of modern sanatorium methods can be drilled in. There is often a delay of a few weeks or months before this can be arranged; this period must be covered by doing something at once, either by rigid treatment at home *with the understanding* that *this is only temporary,* or better still, even if at considerable expense, by sending the patient to some private

institution until cheaper accommodations can be secured.

Other Members of the Family.

The physician has not done his duty toward his patient and toward the community until he has either examined the other members of the family, particularly the children, or in some other way made sure that there are no other cases of tuberculosis among them. A part of treatment also should consist in a thorough cleansing of the patient's room and bedding, and in reporting the case promptly to the local board of health.

Outdoor Sleeping.

If it seems best for the patient to undertake treatment at home at once, or after a short or long stay at a sanatorium to continue treatment at home, some provision must be made for outdoor sleeping. Although sleeping out of doors is every year becoming more common and more popular, in many instances it requires a very firm stand on the part of the physician to persuade the patient and more often the family that this is necessary. It may be hard to explain why a room with three or four windows does not furnish as much fresh air as would be obtained by a bed placed actually outdoors, but experience has shown nevertheless, beyond a shadow of doubt, that sleeping in a room, no matter how large and airy, is never equal to actual sleeping outdoors. There is an occasional patient who is unable to sleep outdoors, owing to nervousness or inability to keep warm. Whatever may be the cause of this, if after a fair trial it has been demonstrated that the patient cannot get a good night's rest under such conditions, the physician should no longer persist in his efforts, but should make the best arrangement possible for indoor sleeping. Details of various arrangements for outdoor sleeping, etc., will be found in the Appendix.

There is a strong tendency among all patients in the early stages of the disease to take too much exercise, in the belief that it acts as a tonic and is otherwise bene-

ficial. This must be cautioned against. In urging fresh air out of doors the physician must see to it that the patient does not take this to mean walking out of doors. This happens very frequently and is constantly doing much harm. For the first month of treatment, whether at home or at a sanatorium, absolute rest, or as near this as can be obtained, will do far more good in the vast majority of instances than rest and exercise combined. If exercise is allowed, it must be prescribed in definite amounts beginning with a ten minute walk twice daily. Observations of temperature and pulse are essential throughout the treatment, but especially during the period when exercise is first allowed.

Rest vs. Exercise.

The patient should be provided with a non-magnifying clinical thermometer, and *should be taught how to use it.* Temperature and pulse should be recorded four times a day, at 8 A.M., 12 M., 4 P.M. and 8 P.M. Temperatures should not be taken immediately after eating nor after exercise unless this is specifically ordered. As a guide to exercise, temperature and pulse should both be taken immediately after exercise and again one hour later. A slight fever and a decided increase in the pulse-rate is not infrequently found immediately after exercise; this should not last more than an hour, however. If at the end of this period fever and rapid pulse still persist, and especially if the patient still feels fatigued, it is an absolute indication for omitting exercise altogether, or reducing it to a minimum. The physician should constantly bear in mind that too much rest is far preferable to too much exercise. A judicious combination of both rest and exercise is what he should strive for in every case. No one familiar with the work of Paterson, at the Brompton Sanatorium, Frimley, England, can but be impressed with the possibilities of graduated labor as a therapeutic agent in the treatment of early pulmonary tuberculosis. It is well to remember, however, before attempting to

carry out this system in private practice that these patients upon whom such remarkably good results have apparently been produced are under the very closest and most constant supervision. This is rarely, if ever, possible in private practice.

Three good meals a day and one quart of milk in addition constitute the basis of diet in tuberculosis. A glass of milk with each meal, between each meal, on arising and on going to bed will suffice.

Diet.

Olive oil in tablespoon doses after meals if it does not upset the stomach, and raw eggs, three or four daily, will be of assistance in certain cases. It is what the stomach can handle and digest and not what is actually eaten which is of importance. A smaller amount of food, well cooked and daintily served, will do more good not only in actual nourishment but in increasing appetite and warding off digestive disturbances than much larger amounts piled on the plate, no matter how great their actual food value. Above all things it is important to remember that mere gain in weight is not essential or always desirable. As a general rule, it is well for the physician to aim to bring about a gain of ten pounds above what the patient considers his normal weight.

A healthy condition of the mucous membrane of stomach and bowels is essential to proper assimilation of food. For this reason it is important to guard against constipation especially when food is being taken in amounts considerably beyond what was previously the custom. It is well, therefore, to prescribe some saline cathartic at least as often as once a week, and to see that the patient is taking at all times plenty of water and food which will tend to prevent constipation.

Care of the Bowels.

Specific Therapy.

Tuberculin given by those skilled in its use can do much good in properly selected cases. In

unskilled hands it can do much harm. The general practitioner is strongly advised not to use it but to leave it entirely to experts in this field.

Artificial Pneumothorax.

This method of treatment, so much discussed at the present time, is rarely justifiable in early tuberculosis. In addition to this, its use should be confined to patients under *absolute supervision* in sanatoria or otherwise, and should be entirely in the hands of experts.

Treatment of Early Tuberculosis in Children.

It has already been stated that, although a tuberculous infection is the rule rather than otherwise, active pulmonary disease is rare among children, and when present cannot be looked upon as an early process. Such cases as these, especially if bacilli are present in the sputum, should be treated in a sanatorium whenever possible. Unfortunately institutions where children with open pulmonary tuberculosis can be admitted and receive proper treatment are rare, and therefore in the majority of instances, treatment must be carried on at home. Fortunately these advanced cases are not common. The large class of children who are urgently in need of treatment and who are only too often neglected, comprises those who do not show any definite pulmonary lesion but are evidently suffering from some tuberculous infection, usually located in the bronchial glands. Prophylaxis is the most important part of treatment in these cases. As Pritchard * says: "The two outstanding factors in successful prophylaxis, as far as tuberculosis is concerned, are: (1) Protection from sources of infection during the first two years of life when the disease is so intensely fatal, and (2) the maintenance of strength during later years of childhood at those special times when the organism is least prepared to protect itself against serious extensions of the tuberculous process."

* Loc. cit., page 46.

This means, first, that a supply of pure clean milk is essential. It has been proved beyond doubt that a certain percentage of cases of pulmonary tuberculosis and a large percentage of cases of glandular tuberculosis are due to bovine tubercle bacilli which gain access to the body by means of milk from tuberculous cows. If a supply of pure milk cannot be obtained it is better to pasteurize it in every case. Second, if the child is in a tuberculous family, it should be removed; and third, every effort should be made to maintain its strength in the period of debility following measles, whooping cough, chicken pox, etc.

As far as treatment itself is concerned there are few diseases which make more rapid and striking improvement under proper conditions than bronchial gland tuberculosis in childhood.

Schooling must be sacrificed, if necessary, in order that the child may spend all of the time in the open air. It can usually be so arranged and is much better for the patient that some school work be carried on. This can be done far better at a sanatorium or outdoor school than at home.

Outdoor Sleeping.

In addition to fresh air during the daytime, some arrangement for outdoor sleeping or a very near approach to it is essential. It is usually easier to do this with children than with adults; even a small baby may sleep out when the proper person cares for it. Children soon get accustomed to their new surroundings and enjoy outdoor sleeping even in the coldest weather. The details of such arrangements are fully described in the Appendix.

Diet.

Diet should be simple, rich in proteids and not too rich in fats, and should include at least one quart of milk daily. Rest is very difficult to obtain but must be constantly striven for.

Healing Power of Sun's Rays.

It is being demonstrated that there is great healing power in the sun's rays. Although "heliotherapy" can be applied most successfully only at a considerable altitude where the air is rarified, dry and pure, the physician will do well to remind the child's parents that rest and play in the sunshine is an important part of treatment.

Tuberculin.

Children are distinctly benefited by tuberculin. The same rule holds true here, however, as in adults, that the general practitioner, unless he has given much time and study to the subject, is rarely in a position to employ this most potent agent.

Summary.

In the treatment of early tuberculosis, therefore, the points of special importance are:

(*a*) Make sure that the patient and his friends clearly understand the situation, the need of prompt treatment and the dangers of waiting.

(*b*) Adult patients should be sent to a sanatorium always if bacilli are present in the sputum and whenever possible in other cases.

(*c*) Do something in the way of instituting treatment at once.

(*d*) Examine other members of the family.

(*e*) Report the case to the local board of health and see that the patient's room is cleaned and fumigated.

(*f*) Advise rest rather than exercise at first; carefully supervise all exercise.

(*g*) It is the food digested, not what is eaten, that counts.

(*h*) Children with active lung involvement are the most dangerous of all consumptives. Such children should be sent to a sanatorium whenever possible. If they are kept at home not only all sputum but the stools

must be carefully disinfected and destroyed, owing to the fact that most children swallow their sputum.

(*i*) Children with early processes whether in the bronchial glands or not, are rarely dangerous to the community. Although as a rule such children are better off in a sanatorium, the majority of them must be treated at home. Such treatment should be along the same lines as for adults and should include fresh air day and night.

APPENDIX "A"

APPENDIX "A"

Illustrative Cases

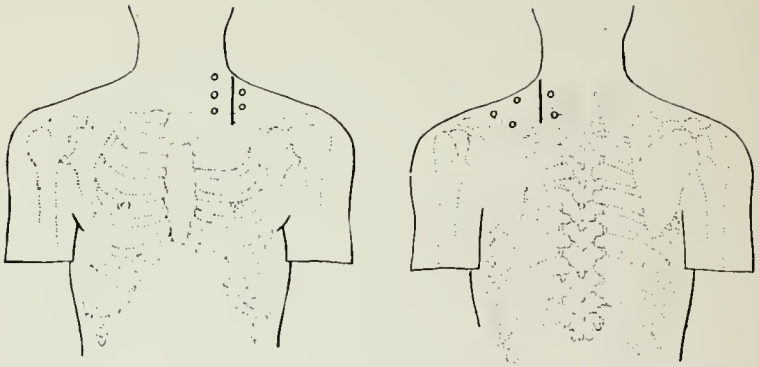
1. Incipient case, favorable course ending in apparent cure.

History: X.Y., m. 28, s. Bank clerk. Dec., 1910. This patient was a strong, healthy young man sent by his family physician to a throat specialist, who in turn referred him to the writer. The patient's older brother was said to have shown definite signs of early tuberculosis while at college, away from home, but the process apparently *cured itself without interruption of college work.* The rest of the family history is entirely negative. Previous to college, while in preparatory school, as well as in college, the patient has led an active athletic life, loving outdoor sports, shooting, riding, etc.

Recently, owing to illness in his family he had been under severe strain physical and mental. Three months ago he caught cold and raised a mouthful of blood. At present, aside from very slight cough and sputum in the morning he *feels perfectly well* in every way.

Physical Examination: The patient is a tall, spare but strong, healthy looking young man, evidently an athlete. Slightly pale. Temperature and pulse normal. At the left apex above the clavicle there is slightly diminished resonance, slightly increased whispered voice, and after cough a few crackles. The rest of the physical examination is entirely negative. Sputum shows a very few tubercle bacilli.

This patient went at once to the Adirondacks and there



spent the winter and following summer under a strict régime. One year later he returned to his old work as a bank clerk in the city and has kept at it ever since. He is now perfectly well in every way; his lungs show no rales or other signs of activity, he has no cough or sputum. He reports for observation every three to four months.

This is a type case, easy to recognize and very amenable to treatment. The process is entirely localized in the lungs as shown by absence of constitutional signs or symptoms of any kind. This class of case, if treatment is instituted at once, is the most favorable type for ultimate cure.

This case also shows the value of a careful family history as giving an idea as to prognosis. The fact that one brother developed tuberculosis and *cured himself* without any radical change in methods of living is significant and hopeful.

2. Direct family infection. No resistance. Rapid course. Death in seven months.

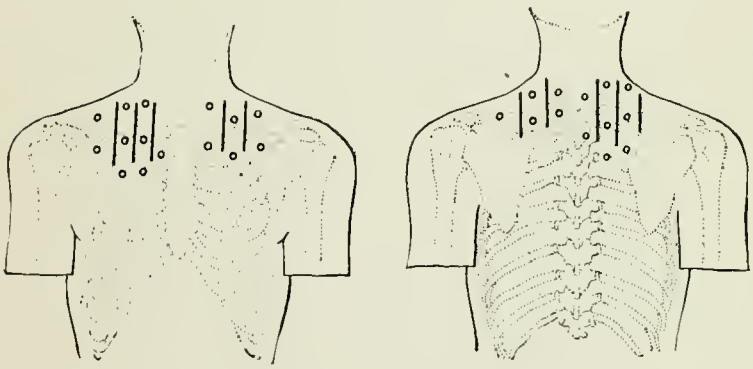
History: A.B., f. 19, s. Bookkeeper. April, 1912.

This patient's father has had chronic phthisis for some years, but *has lived at home* and to a certain extent kept on with his work. He is an intelligent man and has used

every possible precaution to prevent infecting others. One brother has pulmonary tuberculosis at present, now more or less arrested; one sister has tuberculous glands; one brother and one sister have died of tuberculosis.

Up to three weeks ago the patient felt perfectly well and strong in every way and attended to her work regularly. Three weeks ago she came down with the grip, stayed two days in bed, but after a week returned to work. Her cough continued and she lost in weight and strength. A few days ago she raised one small clot of blood. Appetite poor.

Physical Examination: T. 100.8. P. 120. Flushed. *Looks sick.* On examination a fairly extensive process was found at both apices. She was at once admitted to an excellent sanatorium but despite the best of care and treatment the disease steadily progressed and led to a fatal ending seven months later.



The striking feature of this case is the marked lack of resistance to tuberculosis as shown by the rapid and violent course of the disease. It also clearly shows the *great difficulty in preventing the spread* of the disease, where a patient is allowed to continue in the intimacy of home life, no matter what precautions are taken. This

patient and her brother and sister undoubtedly contracted the disease directly from their father. It further shows the great importance of examining *other members of the family.* Had this been done in this instance the result might have been quite different.

3. Repeated hemorrhages due to neglected teeth.

History: R.G., f. 37, m. Hebrew. October, 1910.

This patient was a strong and healthy woman whose family and past history were of the best. One year ago she first noticed bloody expectoration coming in the morning without cough. She has been told by several physicians that she probably had consumption and is now greatly worried. She has lost considerable weight and strength, has pain and " beating " around her heart, poor appetite and is generally run down.

Physical Examination: The patient is a well developed and nourished woman, with good color. T. 99.8. P. 108. The teeth are much neglected, many are missing, the remainder loose and decayed. The gums are spongy and in poor condition. Heart and lungs apparently normal.

The patient was advised to have her teeth attended to and was told that this was the probable cause of the bloody expectoration. This was done, the hemorrhages and other symptoms caused by her nervous state disappeared and she has since been in good health.

Comments are unnecessary. This case shows in a striking manner one source of hemorrhage and also that worry may cause symptoms closely resembling those of tuberculosis.

4. Incipient case becoming chronic, showing wide variations in progress of the disease.

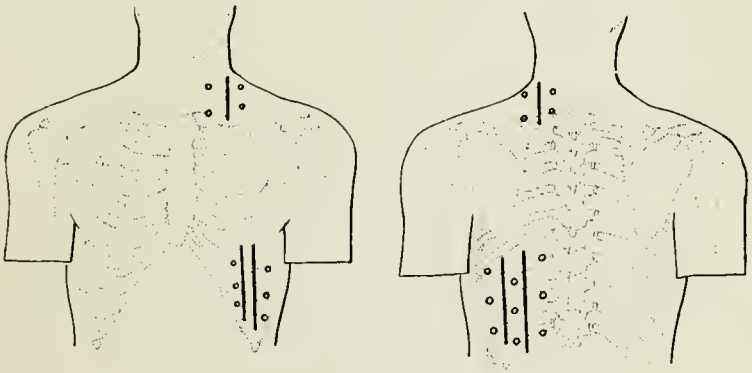
History: M.K., f. 29, s. Stenographer. November, 1908.

The patient's father, one uncle and one aunt died of

tuberculosis. Girl next to her in office had consumption. Past history negative.

In July, 1908, five months previous to this, the patient had what appeared to be a pleurisy of the base of her left lung; two months later she " caught cold " and had a chill. Saw local physician ten days ago who found bacilli in her sputum. At present, she feels perfectly well; strength and appetite good, no hemorrhages or sweats, rarely any cough or sputum.

Physical Examination: The patient is a thin, pale young woman. T. 96.6. P. 110. Wt. 114¼. Lungs show dullness and rales at left apex. Heart, abdomen, etc., negative. A few bacilli present in sputum.

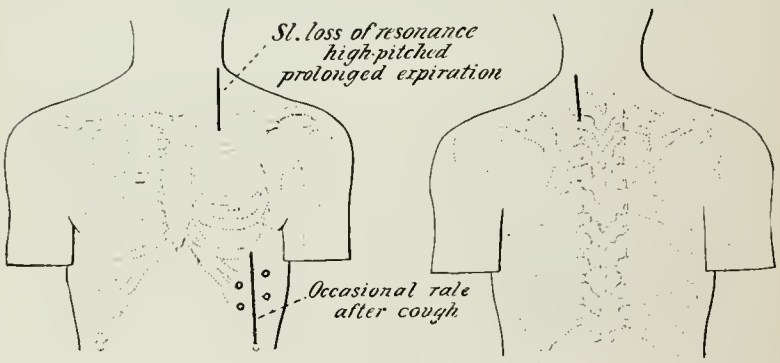


This patient was strongly urged to go to a sanatorium but this she absolutely refused to do. She had a sleeping balcony built, however, and carried on rigid home sanatorium treatment, and during the six months gained fifteen pounds in weight and improved in every way. During the summer of 1909 she again went down hill but in the fall picked up. In November, 1909, one year after her first visit, she was not quite in such good condition as she was the year previous. Her chief complaint was shortness of breath; she had many mild attacks of pleurisy.

During the following year the process slowly advanced, so that both lungs became extensively involved. In November, 1910, two years after her first visit, she developed a distressing sciatica, which proved to be due to a tuberculous process in her hip and spine. She was put in the hands of an orthopedic surgeon, who fitted her to a plaster cast and later a leather jacket. Her condition grew steadily worse and it seemed as if the end could be only a few weeks off. She kept her courage, however, and as months went by became more comfortable. The process in her spine and hip as well as in her lungs gradually quieted down until now, January, 1913, she is quite comfortable, and seems to be slowly but surely improving, though still confined to bed.

This is a striking example of the ups and downs in tuberculosis; it also shows the uncertainty in prognosis, and the value of persistent, faithful treatment over months and years.

5. Very incipient tuberculosis apparently cured by few weeks rest in the country.



History: H.D., f. 22, s. Stenographer. July, 1912.

One brother and one sister died of consumption. Previous history negative.

For the past six months patient has suffered from increasing lassitude, loss of ambition and strength and appetite. Feels generally run down *despite proper vacation*. For two months has had a slight morning cough, with some sputum. No blood. Slight soreness over the sternum.

Physical Examination. T. 99.4. P. 82. Wt. 124. Pale but well developed and nourished. At the left apex there is slight loss of resonance, with high-pitched inspiration and prolonged expiration. At the left base after cough is heard a rare crackle.

She was sent to the country for an absolute rest of two months. At the end of this time she had gained in weight and in every other way, and has since returned to her work. She is now in perfect health.

This is an example of a really incipient case, in which the symptoms are largely constitutional. This type of case is very amenable to treatment if diagnosed early enough.

APPENDIX "B"

APPENDIX " B "

ILLUSTRATIONS—APPENDIX " C "

ZIEHL-NIELSON METHOD OF STAINING SPUTUM FOR TUBERCLE BACILLI

By means of a small pair of forceps or a stiff platinum wire pick out from the sputum purulent or cheesy particles and smear the same on the cover glass.

The cover glass preparation should be spread thinly, dried over the flame of a Bunsen burner and fixed by passing three times through the flame.

Cover the cover glass with carbol-fuchsin solution and steam over the flame for thirty seconds.

Wash in water.

Decolorize until no more red appears, with Czaplewski's reagent, composed of 80 per cent alcohol and 3 per cent hydrochloric acid or 20 per cent sulphuric acid or 25 per cent nitric acid.

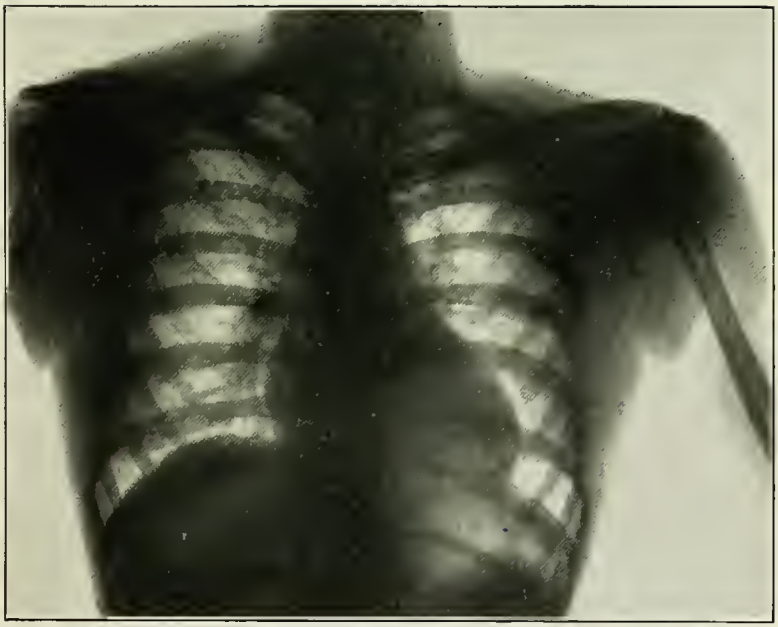
Wash in water.

Cover with saturated aqueous methylene blue and warm slightly for a few seconds.

Wash in water and mount.

Tubercle bacilli are bright red, nuclei and other bacteria are blue.

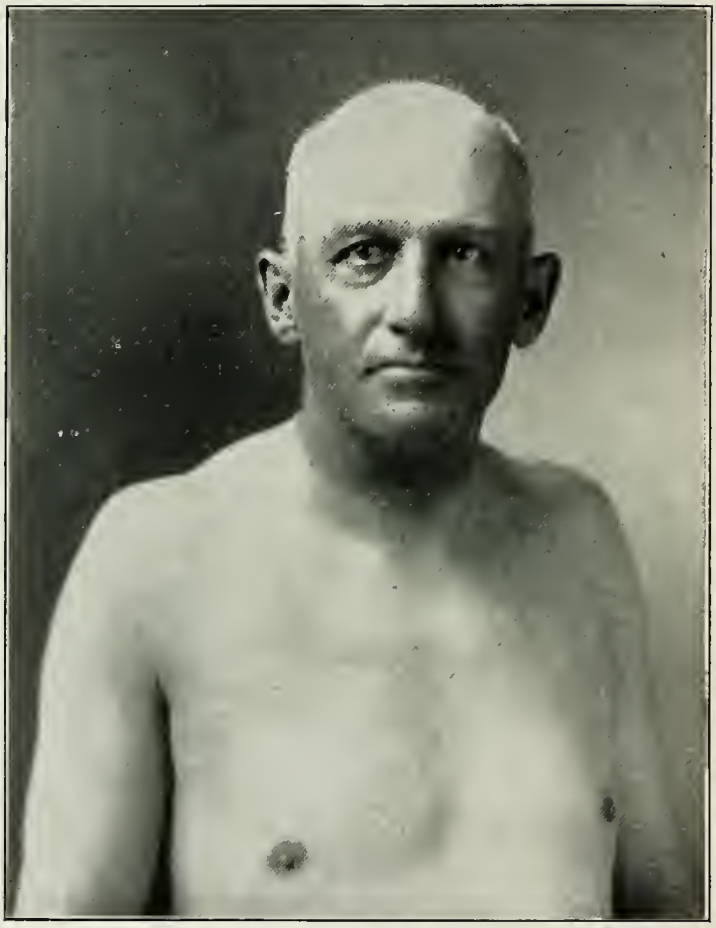
APPENDIX "C"



Courtesy of Dr. Walter J. Dodd.

FIGURE 1

X-ray of normal chest. This plate, despite the shadows and mottlings, is considered normal as far as lungs are concerned by an X-ray expert. It emphasizes the importance of expert interpretation of all X-ray examinations of the lungs.



Courtesy of Dr. Henry D. Chadwick, Superintendent Westfield State Sanatorium.

FIGURE 2

W. R., age 54. Temperature normal. Pulse averages 80. Sputum positive. Active bilateral pulmonary tuberculosis four years. The patient is a picture of health, has very little cough, and feels perfectly well in every way.

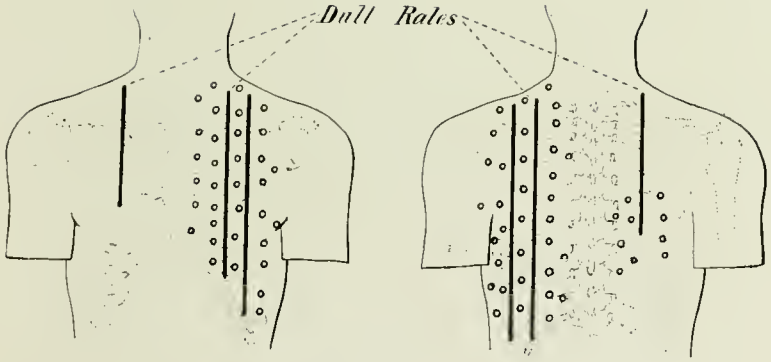


FIGURE 3

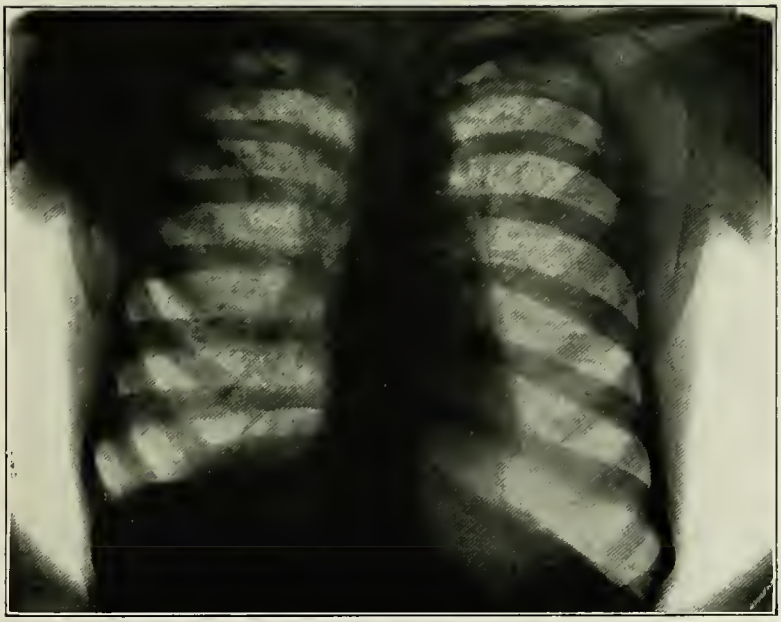
W. R. Diagram showing extensive process in lungs of preceding patient.

Courtesy of Dr. Walter J. Dodd.

FIGURE 4

Thos. B., weight 210, good color, strong and healthy looking. Fairly extensive process at each apex. Many recent hemorrhages. Sputum positive.

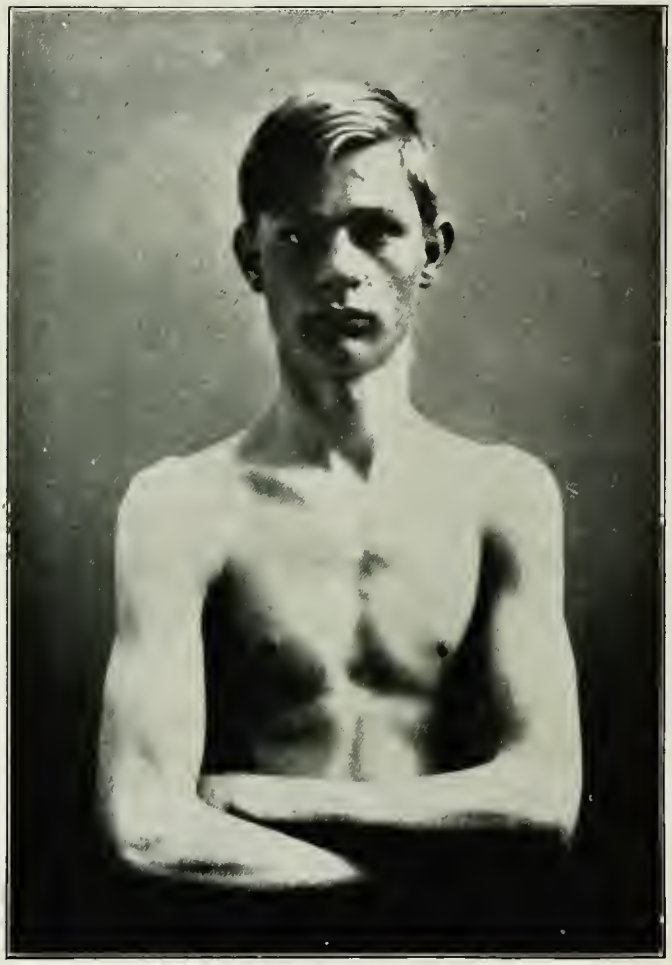
This is a type of case very frequently overlooked and not even examined, owing to his apparent good health.



Courtesy of Dr. Walter J. Dodd.

FIGURE 5

Thos. B. X-ray photograph of chest of preceding patient, showing fairly extensive tuberculosis of each apex. Marked signs present on physical examination.



Courtesy of Dr. Walter J. Dodd.

FIGURE 6

W. S. P. Age 16, tall, pale, poorly developed and nourished. Hemoglobin 65%. Enlarged cervical glands. Loss of weight and strength. Examination of chest shows very few abnormal signs; constitutional signs marked. X-ray shows bronchial gland tuberculosis.

This is a type of patient the reverse of that illustrated by Thos. B., Figure 4, in which the chest signs are slight but the constitutional signs are marked. Both types are urgently in need of treatment, but are frequently overlooked.

Courtesy of Dr. Walter J. Dodd.

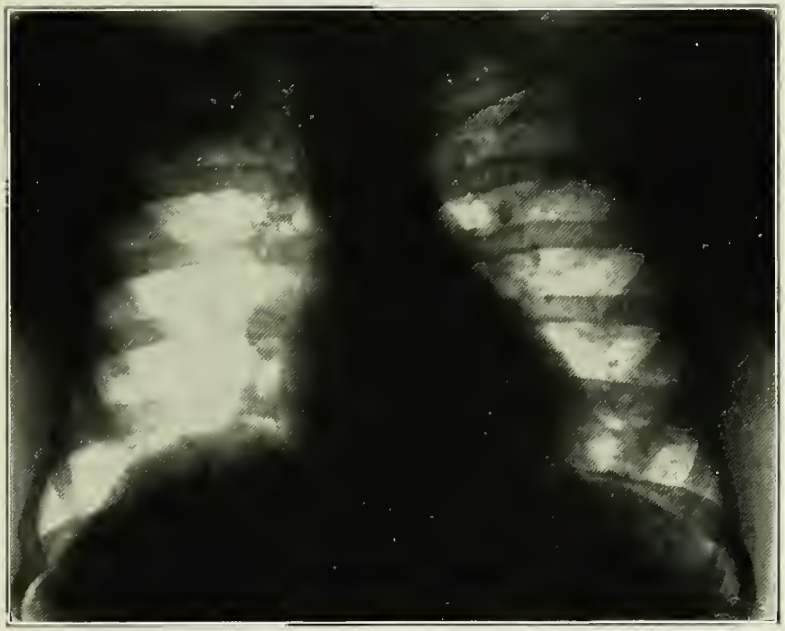
FIGURE 7

W. S. P. X-ray photograph of chest. The shadows near the spine, especially on the right, represent bronchial glands, probably tuberculous. There is no lung involvement as shown by the X-ray.

Courtesy of Dr. Walter J. Dodd.

FIGURE 8

C. J. H. Age 38, weight 80 pounds. Despite the fact that this man had advanced pulmonary tuberculosis, from which he has since died, the signs in the lungs were surprisingly few. No rales were heard at any time, probably owing to weakness on the part of the patient. The constitutional signs were marked and in spite of the comparatively negative lungs, a diagnosis of advanced phthisis was made and confirmed by subsequent events.



Courtesy of Dr. Walter J. Dodd.

FIGURE 9

C. H. J. X-ray photograph of chest. The shadows at the apices and the mottling over the entire chest shows the extensive tuberculous process which is present.

Courtesy of Dr. Henry D. Chadwick, Superintendent Westfield State Sanatorium.

FIGURE 10

L. D., age 8. Tuberculous cervical glands; tuberculous dactylitis; tuberculous bronchial glands. The only symptom referred to the lungs was cough. General condition poor. Enlarged veins on the chest as outlined on photograph were a prominent feature.

X-ray shows enlarged bronchial glands.

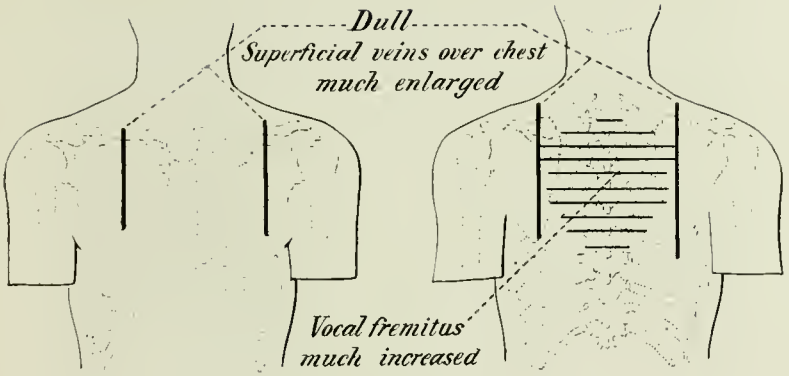


FIGURE 11

L. D. Diagram of chest of preceding patient at entrance to sanatorium, January, 1913. Cf. diagram of condition six months later.

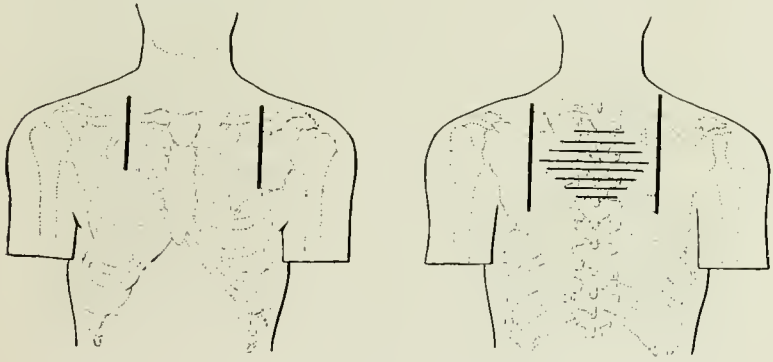


FIGURE 12

L. D. Diagram of chest of preceding patient six months after entrance to sanatorium. Note decrease in extent of dullness and other signs.

Courtesy of Dr. Henry D. Chadwick, Superintendent Westfield State Sanatorium.

FIGURE 13

E. A., age 12. Severe cough following recent attack of measles. General condition poor. No evidence of pulmonary involvement. Enlarged cervical and bronchial tuberculous glands. This type of patient responds extremely well to proper treatment.

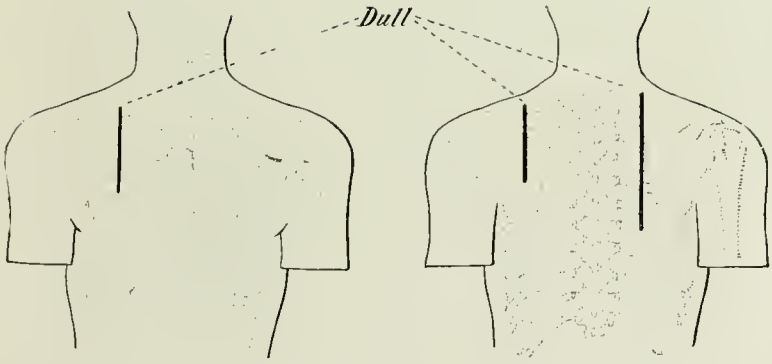


FIGURE 14

E. A. Diagram of chest of preceding patient.

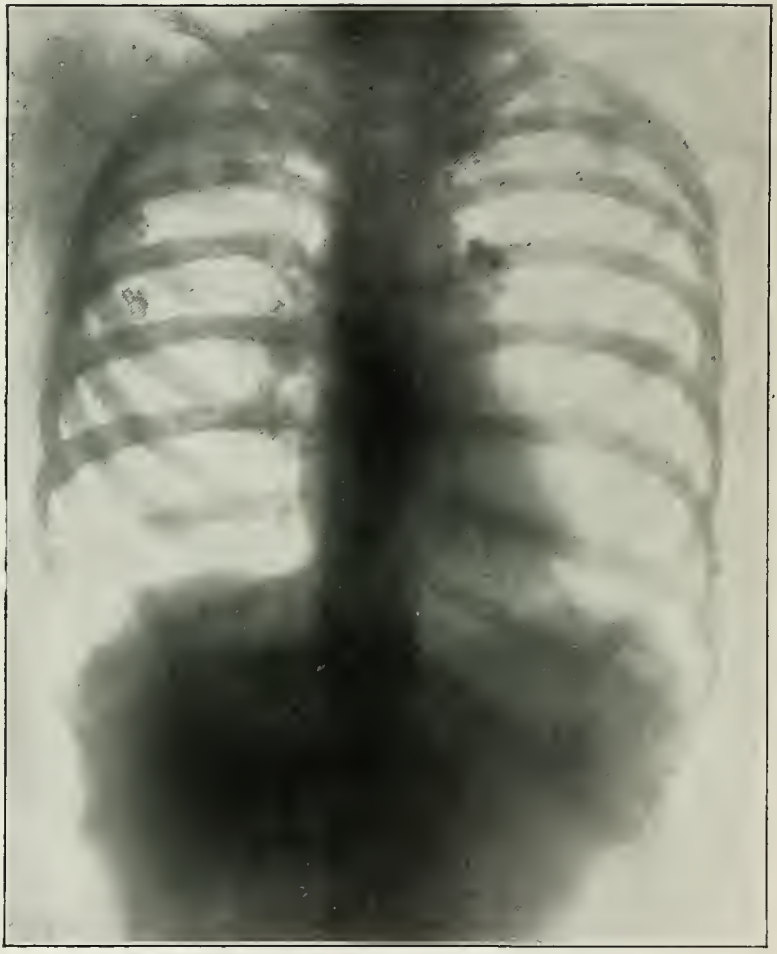
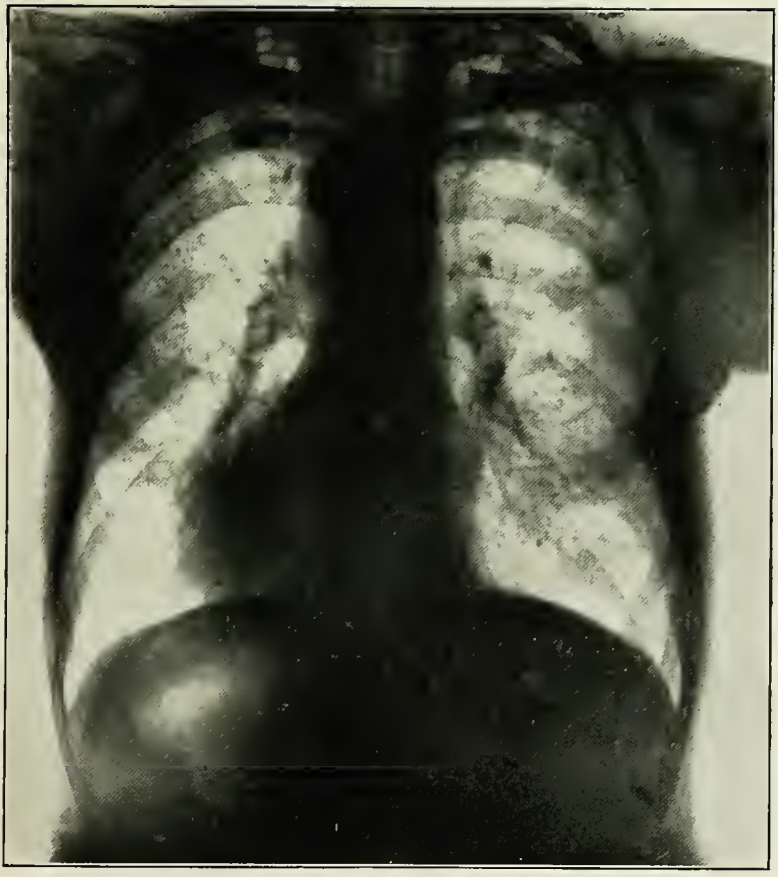


FIGURE 15
X-ray photograph of chest showing enlarged bronchial glands.



Courtesy of Dr. Percy Brown.

FIGURE 16

This is a typical case showing enlarged bronchial glands. It should be borne in mind that evidence from the X-ray plate or photographs is of value only when interpreted by an expert.

APPENDIX "D"

APPENDIX " D "

MASSACHUSETTS TUBERCULOSIS SANATORIA AND HOSPITALS

Rutland State Sanatorium, 350 beds, reserved for patients in the incipient or favorable stages.

State Sanatoria.

North Reading State Sanatorium, 200 beds.

Lakeville State Sanatorium, 200 beds.

Westfield State Sanatorium, 200 beds.

At these last three institutions, situated respectively in the northeastern, southeastern and western parts of the State, patients in any stage of the disease are received. Incipient patients are placed in open pavilions, while, distinctly separated from these, closed wards and rooms are provided for the sicker patients.

Application for admission to any of these institutions can be made by any registered physician in the State by filling out an application blank, a copy of which is given, and sending it to the office of the Board of Trustees of Hospitals for Consumptives, 3 Joy Street, Boston, where it will be placed upon the proper waiting list.

The price of board at each of the State sanatoria is four dollars per week. This, according to the law, must be paid by the patient or by those legally responsible; in case the patient cannot pay, the town in which he has a legal settlement must pay and in case of no local settlement, the State bears the expense. *It should be borne in mind that lack of funds need debar no patient from admission to the State sanatoria.*

In addition to the State sanatoria there are many excellent local municipal tuberculosis hospitals to which advanced and dying cases can be admitted and where patients waiting admission to the State institutions can gain temporary shelter. To indigent patients with local settlement in the city or town in which the hospital is situated there is no expense; patients who can pay themselves, or who are settled elsewhere, are generally charged at the rate of ten dollars a week.

Local Municipal Tuberculosis Hospitals.

There are a few excellent private sanatoria in Massachusetts. Most of these are located at Rutland near the State sanatorium. At these Rutland Cottages private patients can be taken at rates ranging from ten to twenty-five dollars per week. In addition to these there are a few private charitable hospitals where indigent patients, generally in the advanced stages, can be cared for.

Private Sanatoria.

Information in regard to any of the above-named hospitals or sanatoria can be obtained at the office of the Board of Trustees. A copy of the application blank to be filled out for the admission of patients to the Massachusetts sanatoria is appended.

The Commonwealth of Massachusetts

TRUSTEES OF HOSPITALS FOR CONSUMPTIVES

3 JOY STREET, BOSTON

NAME: Date , Male — Female Age Citizen of U. S. Yes / No

Address Single — Married — Widow Has patient a legal settlement?

Has patient previously been at any State Sanatorium? If so name Sanatorium and date

Name and address of nearest relative or friend Who is responsible for patient's board?

The examining physician should give information on the following points as fully as possible:

HABITS: Alcohol

Tobacco

Previous diseases

How long sick At work or not

Fever

Present temperature A.M. P.M.

Present pulse A.M. P.M.

Tuberculous laryngitis

Present weight

Loss of weight

How much

Weakness

Dyspnœa

Pain

Chills

Night Sweats

Diarrhœa

Anemia

Cough

Hemoptysis

Sputum

Tubercle bacilli { Present / Absent / Not examined

Any other complications

Are there any other cases of tuberculosis in the family?

Lungs. Indicate on diagram extent and location of Pulmonary process, using the following signs:

Slight dullness, 1 vertical line, I

Moderate 2 " II

Marked 3 " III

Fine rales, °°°

Medium VVV

Coarse " +++

Heart

Physician's estimate of case

Stage of disease — Incipient — Moderately advanced — Advanced

(Classify according to classification on back of this blank)

Remarks:

Signed .....M.D.

Address.....

(OVER)

The Rutland State Sanatorium is reserved for patients in the ineipient and favorahle stages of the disease, preference being given to those who are citizens of this country. Patients making applieation for this institution will he put provisionally upon the list, and further inquiry will he made as to their eondition shortly before their names are reached.

This blank must he filled out by a registered physician and sent to the office of the Trustees of Hospitals for Consumptives, 3 Joy Street, Boston.

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APPENDIX "E"

APPENDIX "E"

DIRECTIONS FOR LIVING AND SLEEPING IN THE OPEN AIR

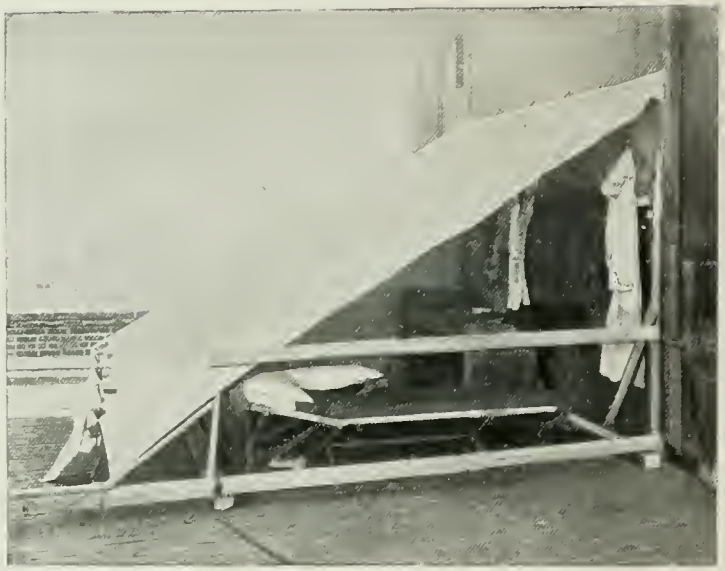
[Printed by the courtesy of the author, Dr. Thomas S. Carrington, Assistant Secretary of the National Association for the Study and Prevention of Tuberculosis.]

Introduction

Consumption, or tuberculosis, is a disease of the lungs which is taken from others and is not simply due to catching cold. It is generally caused by germs, known as tubercle bacilli, which enter the body with the air breathed. The matter which consumptives cough or spit up usually contains these germs in great numbers, and if those who have the disease spit upon the floor, walls or elsewhere, the matter will dry, become powdered, and any draught or wind will distribute the germs in it with the dust in the air. Any person may catch the disease by taking in with the air he breathes the germs spread about in this manner. He may also contract the disease by taking into his system the germs contained in the small drops of saliva expelled by a consumptive when coughing or sneezing. It should be known that it is not dangerous to live with a consumptive if the matter coughed up by him is properly disposed of.

Consumption may be cured at home in many instances if it is recognized early and proper means are taken for its treatment. When a member of a family is found to have consumption and cannot be sent to a sanatorium, arrangements for taking the cure at home should be made as soon as the disease is discovered.

The following directions are published to help persons



A lean-to tent shelter on the roof of an apartment house in New York City.

Tent shelter on a tenement house roof, partially protected from the wind by the stairway cover and nearby buildings. Work of the Bellevue Hospital Tuberculosis Clinic.

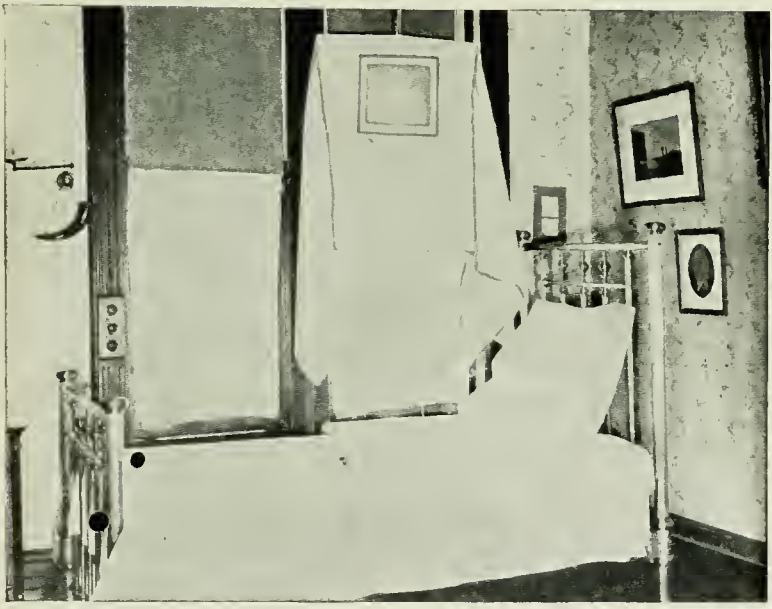
A bed on the roof of a court of a tenement house, protected on the sides from the wind by the walls of upper stories. Work of the New York Association for Improving the Condition of the Poor.

to carry out the open-air treatment in their own homes. Many families are unable to make any great change in their mode of living and cannot afford to fit up porches and buy extra bedding or warmer clothing. A number of the suggestions given here are very simple and inexpensive, and will help those who would like to use what they have at hand in making an outfit for outdoor life.

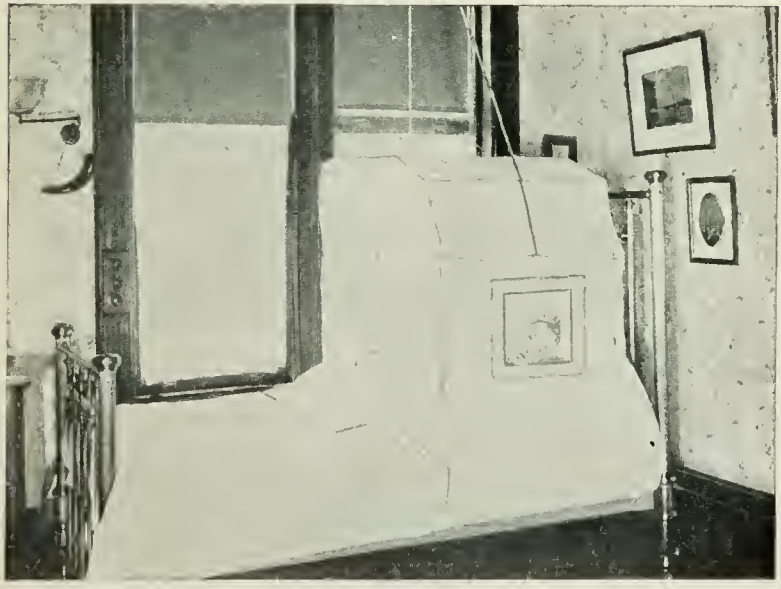
IT IS IMPORTANT, IN THE TREATMENT OF TUBERCULOSIS, TO BREATHE AIR THAT IS FRESH AND PURE, TO EAT AN ABUNDANCE OF GOOD FOOD, TO STOP HEAVY WORK AND WORRY, AND TO TAKE A BODILY AND MENTAL REST BY LYING DOWN BEFORE AND AFTER THE NOON AND EVENING MEALS. To obtain the first, the patient must live out of doors. This means that as many hours of the day and night as possible should be spent in the open air, and in order to carry out this treatment some place must be provided which is not only protected from wind, but also from rain and snow, as nothing except the most severe cold weather should prevent the patient from living and sleeping there. The outdoor shelter should be large enough for a bed, a reclining-chair and a table. It should overlook pleasant and sanitary surroundings if possible, as it is to be the home of the patient for months, and will give better results if comfortable and attractive.

How to Take the Open-air Treatment in a Tenement House

Tenement house dwellers and persons living in apartment houses in large cities should make every effort possible to give the open-air treatment to a member of the family who contracts tuberculosis. First, consider the possibility of moving into the suburbs or nearby small towns. If this cannot be done, try to obtain from the landlord the use of the roof and build a small shack there as described on page 95. If this is beyond the means of the family, use one room with a window opening on



Dr. S. A. Knopf's window tent raised when not in use.



Dr. S. A. Knopf's window tent in position, with patient in bed looking through the celluloid window into the room, but breathing outdoor air only.

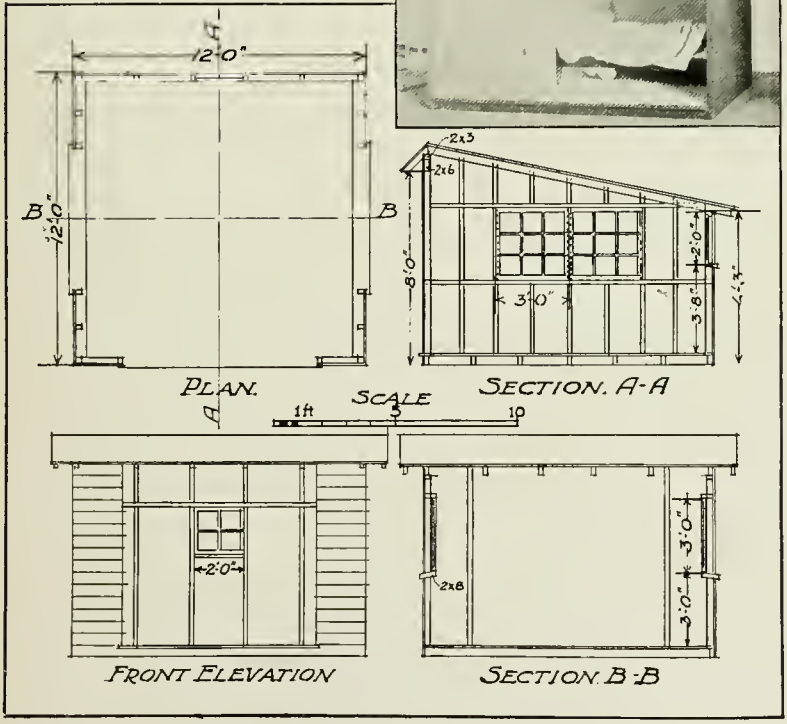
a street or large court for the patient, and then place the head of the bed beside the window and cover it with a window tent. The cost of a window tent is about $10.00, and if it cannot be obtained, take two large, heavy cotton sheets, sew them together along the edge, tack one end of the double sheet to the top of the window casing and drop the lower end over the outer side of the bed, fastening the bottom of the sheet to the bedrail with tape. There will be enough cloth hanging on each side of the window to form the sides of the tent, and these should be fastened to the window casings. A window tent can be made at home for about $3.00 by using 12 or 15 yards of heavy denim or light canvas. One straight piece of denim should be hung from the top of the window casing to the outer side of the bed, and the openings between this and the side window casings filled in with sides cut and fitted from the balance of the cloth. By these methods the patient gets fresh air from the window and the room is kept warm in cold weather as a place for dressing and toilet purposes. During mild and warm weather, the tent can be removed and the window kept open both at top and bottom.

The flat roofs of tenement and apartment houses in large cities should, if possible, be used as a breathing place by the tenants. Shacks or cabins can be built upon them at small cost and make an economical and easily provided shelter.

How to Build a Small Shack or Cabin on a Flat Roof in the City

Two by four timbers should be used for the frame and siding boards for the back and sides. The front of the shack should face slightly to the east of south and be left open, but arranged with a canvas curtain, tacked on a roller so that it can be closed in stormy weather. The

A simple wooden shack for a family of three which can be constructed on the roof of a tenement house or in a yard. Planned by Dr. H. E. Kirschner for the Oil City, Pa., Sanatorium.



Front view, floor plan and elevations of a shack for flat roofs, to go with list of lumber below. Loaned by Mr. W. H. Scopes.

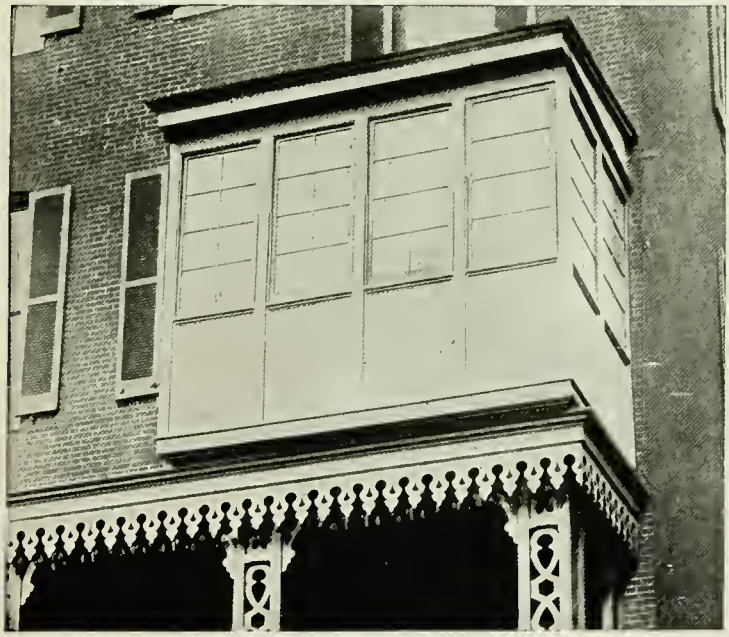
shack can be built cheaply with rough boards and the roof covered with tar paper or other roofing. As the vast extent of flat roof space in all cities and in many towns should be used for outdoor living and sleeping, detailed plans for building a shelter on them and a list of material, together with the approximate cost, are given. The plans and list will be understood by any carpenter, and when the shelter must be built economically it is advisable to confer with the neighborhood carpenter, rather than place the construction in the hands of a contractor or builder

List of Material and Estimate of Cost for Constructing a Small Open-air Sleeping Shack on a City Roof or in a Country Yard

328 feet of rough lumber as follows, at $30.00 per M.	$9.84
4 pieces, 2 inches by 4 inches by 12 feet, sills.	
5 pieces, 2 inches by 4 inches by 12 feet, floor joists.	
14 pieces, 2 inches by 3 inches by 14 feet, studs.	
5 pieces, 2 inches by 3 inches by 12 feet, plate.	
1 piece, 2 inches by 6 inches by 12 feet, plate (front).	
1 piece, 2 inches by 8 inches by 12 feet, rail for sliding sash.	
9 pieces, 2 inches by 4 inches by 14 feet, rafters and rafter tails for front eaves.	
300 feet of novelty siding for walls at $30.00 per M.	9.00
250 feet of shiplap roof boards at $26.00 per M.	6.50
200 feet of 7-8 inch common flooring at $32.00 per M.	6.40
One-half roll Neponset Red Rope Roofing at $5.00 per roll	2.50

10 pieces of 1-inch half round for roofing at 1 cent per foot	$1.40
1 canvas curtain on roll	5.00
4 sliding sash, 3 feet by 3 feet, at $2.00	8.00
1 casement sash and frame, 2 feet by 2 feet, at $2.00	2.00
Hardware	1.00
Strips for sliding sash	1.00
Paint	5.00
	57.64
Labor	25.00
	$82.64

NOTE.—Canvas can be bought by the yard and a curtain made at home.



A temporary porch with glass and sash protection, built on the rear wall of a tenement house. Loaned by the Journal of the Outdoor Life.

A window tent seen from outside. The flat and extension roofs of the next house are good sites for a shack or tent.

Two sleeping porches, one built over the roof of a back extension and the other built in a corner of the house.

How to Arrange a Porch on a House in the Country

If the family lives in a small town or in the country, it will usually be found that a porch is the most convenient way of providing open-air quarters. In selecting a site for the porch, it is well to remember that the patient should be placed out of doors in such a way that the cure can be taken with comfort at all seasons of the year. For the winter months the best place is on the south side of the house, as there will be found the greatest amount of sunshine. If this cannot be done, choose first the east, or, second, the west side, but not the north side except as a last resort, for it is a windy and cold position in winter. The back of the house is usually better than the front if the porch cannot be seen from the street, but what is of the most importance is TO FIND A SHELTERED SPOT PROTECTED FROM THE WIND, FOR THE WIND IS MUCH HARDER TO BEAR THAN EVEN INTENSE COLD. When a house has permanent verandas and the family cannot afford the expense of providing a special porch for the patient, the permanent veranda on any floor may be used and privacy and protection obtained by putting up canvas curtains or bamboo screens.

If a special porch for winter use is to be built, place it on the south side of the second story of the house, with an entrance into a room which can be used by the patient. For a passageway to the porch cut one of the windows down to the floor and put in a door 3 feet 8 inches wide, so that the bed can be rolled from the room to the porch without difficulty. If the room is not heated by some other means, a stove should be used and the air kept warm, so that the patient may have a comfortable place for dressing, eating and to enter when chilled. Build the porch out from the door 10 feet wide by 10 feet long and 7 feet or more in height from floor to ceiling. Place glass and sash on the side of the porch most exposed to the weather, and hang canvas curtains on rollers

A well-constructed porch with screens and awning protection, built on the roof of a first-floor veranda. Loaned by the State Charities Aid Association, New York.

Showing a simple method of using the front veranda of a country house by protecting the sleeping quarters with canvas curtains. Loaned by the State Charities Aid Association, New York.

to inclose the open sides in stormy weather. Lay the floor with narrow spruce boards, using white lead and oil to fill in the cracks, at a grade of 1 inch to 5 feet, so that water will not stand during stormy weather. A porch of this kind can be built in small towns and in the country for from $50.00 to $100.00, the cost depending upon the class of material used and the way the porch is finished.

How to Build a Cheap Porch

A useful porch can be built for $12.00 or $15.00 with cheap or second-hand lumber, and if only large enough to receive the bed and a chair will still be effective for the outdoor treatment. The roof can be made with a canvas curtain or a few boards and some tar paper. The end most exposed to the wind and rain and the sides below the railing should be tightly boarded to prevent

A cheap temporary porch protected by an awning and supported by braces set at an angle.

A good method of building a porch on the back of a cottage for country use. Loaned by the Journal of the Outdoor Life.

A cheap porch protected by awnings, built on the roof of a first-story veranda.

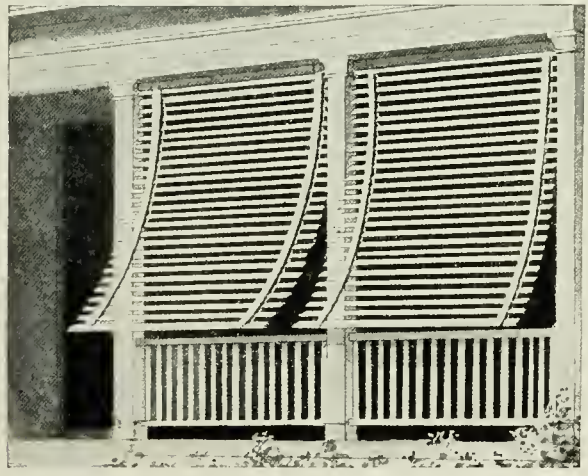
draughts. A window can be used for the approach, but it will be more convenient if it is cut down to the floor and a small Dutch door put in below the window-sash. Second- and third-story porches are supported from the ground by long 4 by 4 posts, or, when small, they can be held by braces set at an angle from the side of the house.

How to Provide a Shelter for the Summer and for Hot Countries

Consumptives need a good shelter in tropical countries and protection during the summer months in northern climates. A porch should be placed on the side of the house where the direct rays of the sun will not strike it during the middle of the day, and tents or shacks placed under shade-trees or in the shadow of large buildings.

Awnings which jut out from the roof of a porch or shack are used for shade, and Japanese drop curtains made of long strips of bamboo for privacy, as they do not stop the current of air.

In places where the streets are not watered, a hose



Showing a cheap method of protecting a sleeping porch in hot weather with Venetian blinds. Loaned by the J. G. Wilson Mfg. Co., New York.

A good method of supporting a tent by a frame, showing the well-built floor and ventilator in the peak. Used at the Otisville Sanatorium, N. Y.

This is a good way to arrange a netting as a protection from insects. Notice the barrel-hoops tied to the bedstead. Loaned by the Journal of the Outdoor Life.

should be used to lay the dust in front of the house, and the floor of the porch or shack sprinkled once or twice each day to cool the surrounding air.

The open sides of the shelter must be screened from the floor to the roof with wire netting as a protection from flies and mosquitoes, and when this is impossible, a mosquito-bar made of cheese-cloth, netting or scrim should be hung from the roof or laid over barrel-hoops attached to the head and foot of the bedstead.

Tents and Tent Houses

Tents and tent houses can be used as a shelter in warm, dry climates and for the summer months in northern countries, but they are not very satisfactory for winter use in cold climates.

In order to make a tent comfortable for a sick person, it should have a large fly or double roof with an air space between, a wide awning in front where the patient can sit during the day, a board floor laid a few inches above the ground and the sides boarded up two or three feet from the floor.

The Bed and Bedding Used in Outdoor Sleeping

An ordinary iron bedstead with woven wire spring 3 feet 6 inches wide and a moderately thick mattress are all that are necessary except for very cold weather. A bedstead which can be rolled about easily is a great convenience, and should therefore be fitted with small rubber-tired wheels or casters. A good hair mattress is most desirable, but when it cannot be obtained, a cotton-felt mattress can be bought for as low as $4.00, or a wool mattress for about $10.00. In northern climates, where cold weather must be expected, two mattresses with several layers of newspaper between them are often used.

An Emmanuel Church class patient taking the open-air treatment in a back yard of a Boston Tenement.

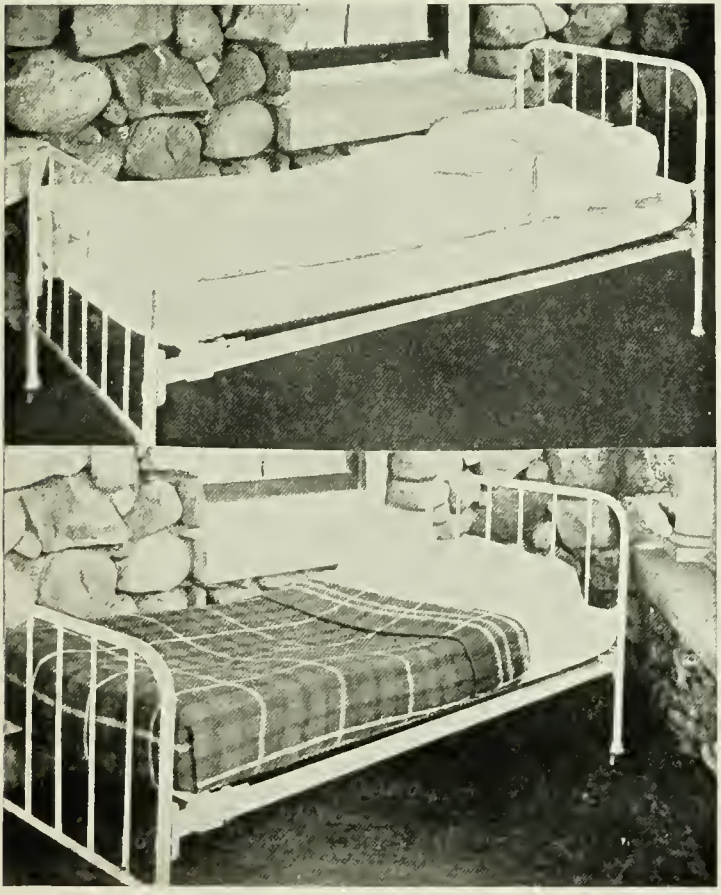
Over the mattress place an old blanket or a cotton bed-pad, the same width as the mattress, and on this the ordinary bed-sheets or blanket-sheets.

Bed Covers Used in Outdoor Sleeping

Persons who like heavy bed covering may use blankets, placing as many layers over the bed as desired for warmth. Those who cannot stand heavy covering can use down comforts, as they are very warm but light. If these are too expensive, lamb's-wool or cotton-filled comforts can be bought, or the material for wool or cotton quilts can be obtained for about $2.00 and warm, satisfactory covering made in the home. Very cheap, light, but warm covering can be made by using paper blankets placed between two thicknesses of outing flannel or bed covers. These paper blankets are sold for 50 cents each and wear for about six months. A woolen horse blanket with an outside of canvas can be used as a covering to protect the bedding in wet and stormy weather.

Sleeping-bags

In very severe weather a sleeping-bag may be used for patients who are very susceptible to the cold. These bags can be bought at department stores for $15.00 upward, or can be made at home by sewing blankets together around the edges, leaving the top open. In making a



How to make a sleeping-bag with the bed-clothes. First tuck all covers except the top blanket under the bed-pad, and then tuck the top blanket under the mattress. Loaned by the Journal of the Outdoor Life.

bag, use as many layers as may be desired, but place the same number of thicknesses on both sides of the bag. The blankets should be 7 feet long by 4 feet wide.

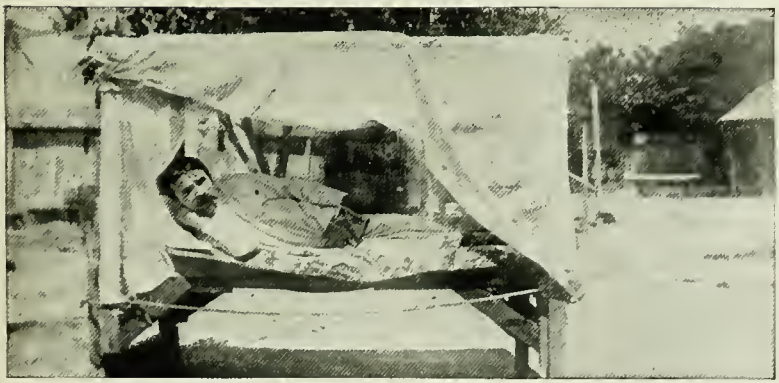
Arrangement of Pillows in Outdoor Sleeping

Two pillows should be used in preparing the bed before retiring. Place them in the form of an inverted V, with the apex at the top of the bed and the head at the point where the two pillows meet. This position allows the shoulders to nestle between the pillows and protects them from the cold wind which will otherwise find its way under the bed-clothes when the patient lies on his side or turns over.

How to Prepare the Patient for the Night

In cold weather the outdoor sleeper should get into the bed in a warm room and have someone roll him out of doors. When this cannot be done, use a warm dressing-gown in going back and forth from the dressing-room to the porch, and warm the bed by placing in it for a few minutes before retiring, a hot-water bag, hot bricks, soapstones or bottles filled with hot water. In some instances it is well to leave a hot stone or bottle wrapped in flannel at one corner of the bed, where it will throw off heat slowly during the night.

In tucking in the patient at night, all covers except the top blanket or comfort should be tucked in under the bed-pad which lies on the mattress. The topmost cover is then tucked under the mattress to keep the under covers from sliding off when the sleeper is restless. This method of tucking-in forms a sort of sleeping-bag with the bed-clothes, known as the Klondyke bed, and prevents the cold air from reaching the body.



A method of screening beds in hot countries. Loaned by the Journal of the Outdoor Life.

Clothing Worn at Night

The night clothes worn by the outdoor sleeper during the winter depends largely upon the strength of the patient. Some persons need much more than others, but even the weakest can usually keep warm if they have blanket-sheets and hot bottles. A woolen undershirt, a sweater and a long outing flannel nightgown or bathrobe are usually worn, but in very cold weather some patients wear a pair of drawers made of flannel, a pair of bed-socks or knitted slippers and a woolen abdominal bandage.

A knitted helmet for protecting the head, neck and shoulders. Loaned by the Journal of the Outdoor Life.

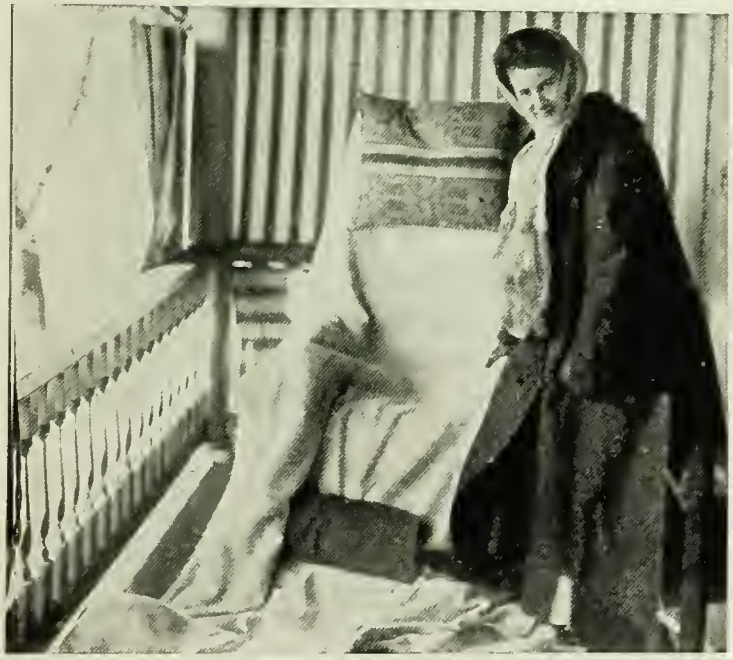
How to Protect the Head from Draughts

The head of the bed should be shielded from the wind or a strong draught by placing it close to the protected end of the porch, or by covering it with a canvas hood supported on a barrel-hoop attached to the bedstead or hung by a rope from the ceiling. The patient can wear a knitted skull-cap long enough to be pulled down to the end of the nose and over the ears, or a knitted helmet which covers the whole of the head, face and neck, with the exception of a small opening for the nose and mouth. A hood shaped like an old-fashioned sunbonnet is very comfortable, and can be made at home from eiderdown or outing flannel by using as many thicknesses as may be needed. Never cover the head with the bed-clothes. If the nose grows cold, use a small piece of flannel, held by elastic bands from the ears, to cover the top, or a piece of cotton held in place by a strip of adhesive plaster. Care should be taken not to interfere with the inhaling of fresh air or to allow the breath as it is expelled from the nose or mouth to come in contact with the cloth and form icicles. Chapping of the face during the night can be prevented by using cold cream or vaseline about the nose and lips.

Clothing for Daily Use

The clothing for use during the day when the patient is up or sitting in a reclining-chair should be of light weight but warm. Underclothes of half cotton and wool or linen mesh, and a sweater which buttons in front, with the ordinary outer clothes, are usually worn. The overcoat for men, women and children should be of fur if possible, as even the cheapest of skins are warmer than any other kind of garment. If a new coat cannot be bought, a heavy cloth overcoat will give good protection, and be much warmer if it has a high, soft collar. Leather

leggins and woolen tights are used as extra garments, and are a great comfort when taking exercise on cold days.



1. How to wrap a patient in a chair. The reclining-chair is first overlaid with a rug or a comfortable, and double blankets extended their full length, leaving the free ends on the floor. Loaned by the Journal of the Outdoor Life.

How to Protect the Hands

Patients who wish to use their hands while sitting out of-doors in cold weather can wear thin, well-fitting cotton gloves. These are used by army men, and can be bought for thirty cents a pair. Over them should be drawn a knitted woolen glove with the ends of the fingers and thumb cut off and bound to prevent unraveling. For ordinary protection, when not at work, a heavy fur or woolen mitten should be worn with long, woolen wristlets.

Never use tight gloves of any kind in cold weather, as they restrict the circulation of the blood and cause the hands to grow cold.

How to Protect the Feet

Use woolen stockings, and if they cause irritation, wear a cotton stocking next to the skin. Sometimes two or more pairs of woolen stockings are necessary in very cold weather, but they must always be large enough to fit loosely. Felt shoes are warm and light, and are much used. Soft leather shoes covered by large fur-lined leather shoes are very warm and comfortable, but are expensive, as they must be made in a set, to order. Foot-muffs should be used in sitting out during a cold day. They are made of fur or of cotton quilts sewed up like a bag, into which the feet can be placed. On very cold days the muff can be placed in a wooden soap-box with hot bricks beside it, and newspapers wrapped about the muff to fill in the empty space.

Chairs for Day Use

An easy-chair is a great comfort to the patient during the day. A steamer chair is easily obtained and gives good service, and the canvas chair with a wooden frame can be bought for $1.00, or the cane-seat extension-chair for $2.50 up. A more durable chair is made for this purpose with an iron frame, costing about $25.00, which can be transported and used in a rough manner without danger of breakage. To prevent the cold currents of air reaching the patient from below, the chair must be covered with some thick, closely woven, warm material. A fur rug is the best for this purpose, but several layers of blankets and newspaper will answer and are more economical.

2. How to wrap a patient in a chair. After seating yourself, draw up the free ends of the blanket and tuck in at the sides. A steamer rug is placed over all. Loaned by the Journal of the Outdoor Life.

Table for Work and Amusement Purposes

The patient should have a table handy on which to keep books and other things used for amusement or work. An adjustable table, the top of which the patient can swing before him or away, is a great convenience, and can be used as a book-rest when the hands are under cover.

General Directions for the Care of the Patient

The directions for the care of the patient are not intended in any way to take the place of a physician's orders. Every consumptive should consult a doctor, and these suggestions are given to help the patient carry out his directions. Rest is a most important part of the

open-air treatment, and exercise must be regulated by the doctor. Always have at hand an extra wrap, and never remain out if chilled. Cold weather should have a bracing effect, and when it does not, go into a warm room and get a hot drink, preferably milk, remaining indoors until comfortably warm. When going out again use more wraps, and keep behind a shield or screen that breaks the force of the wind. Always be cheerful and hopeful; never waste your strength in anger or by being cross. Lead a temperate life, go to bed early and get up late; do not use alcohol in any form except when prescribed by your doctor. Do away with tobacco if possible, and use only weak tea and coffee in small quantities. Never swallow the matter coughed up, but always destroy every particle by spitting in a paper or cloth which can be burned. Never allow the hands, face or clothing to be soiled by sputum, and if this happens by accident, wash the place soiled with soap and hot water. Men who have consumption should not wear a mustache or beard unless it is trimmed close. Particular care must be taken, when sneezing and coughing, to hold in the hands before the face a cloth which can be burned. Soiled bed-clothes, nightdresses, other washable garments and personal linen should be handled as little as possible until they are boiled prior to their being washed. The dishes used by the patient must be boiled after each meal.

All the above means care and work, but must be done both as a protection to the household and in order to bring about a speedy cure for the patient.

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